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THE USE OF FLUORINE COMPOUNDS AS INSECTICIDES, A REVIEW WITH ANNOTATED BIBLIOGRAPHY

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CONTENTS

	Page
Introduction	II
Chemistry of fluorine	
Properties	III
Classes of compounds	III
Occurrence and distribution	IV
Sources of fluorine	IV
Requirements for insecticidal use	V
Value as insecticides	VI
Present status of fluorine compounds as insecticides	VII
Tolerance as spray residue	VIII
Spray-residue removal	IX
Methods of analysis	IX
Bibliography	1
U. S. patents on fluorine compounds in relation to insect pest control, 1925-1935	120
Index of authors	126
Subject index	135

II

INTRODUCTION

For many years there has been a marked demand for new and better insecticides. This demand has been largely the result of two factors, first the need for better control of insects that are becoming more and more destructive, and second, the recognition of the health hazards of the residues from certain insecticidal sprays and dusts if they are left on products intended for human or animal consumption.

Lead arsentate and other arsenicals have been, and still are, the main reliance of those engaged in the economic control of certain insects. To control these insects, however, it is necessary to apply large dosages and maintain them throughout the season. The residues must then be removed before the fruits and vegetables are safe as food. Development of substitutes for arsenical compounds which would be less toxic to humans and animals and still be sufficiently toxic to insects has therefore occupied the attention of chemists and entomologists.

The compounds of fluorine are one of the principal classes of non-arsenical inorganic materials that have been investigated. As the reports of these investigations are scattered through many chemical and entomological journals, for the convenience of those interested there is presented here a summary of the available information on the insecticidal properties and applications of the compounds of fluorine. There is also included the information available on fluorine-spray-residue removal and such methods of analysis as are applicable to this type of work.

References to the use of fluorine compounds in wood preservation and similar applications where insect damage may also be a factor are also included, as well as to information on damage to plants incident to the use of fluorine insecticides. Purely bactericidal and germicidal uses, however, are not considered as part of this review.

References are given in chronological order by years, and when more than one reference is given for any year, they are arranged in the alphabetical order of the authors' names.

The United States patents relating to fluorine compounds in insect pest control have been listed separately 615-692. References to patents relating to fluorine compounds in mothproofing have not been included in this bibliography, as they have previously been listed by Roark (287, 436, 614).

The bibliography is intended to be complete up to December 31, 1935.

Names of insects, both scientific and common, are given as they appear in the reference cited, whether or not they are valid or approved names. In the Subject Index the entry is made under the

scientific name where both names appear in the citation, with a cross reference from the common name, but where only one name is given the entry is made under that name. For example, references to the Japanese beetle entered under "Japanese beetle" refer to the insect by its common name only, and those entered under "Popillia japonica" refer to the insect either by its scientific name alone or by both scientific and common names.

CHEMISTRY OF FLUORINE

Properties

Fluorine belongs to the class of elements known as the halogens, which includes also chlorine, bromine, and iodine. It is one of the most reactive elements known, being found in combination with all but a very few of the other elements. Many of the reactions occur spontaneously with the release of much energy, and many organic compounds decompose and take fire in the presence of fluorine gas. The fluorides resemble the other halides in some of their properties, but in many respects they differ. For instance, the silver salts of chlorine, bromine, and iodine are relatively insoluble in water whereas silver fluoride is soluble, and the calcium salts of chlorine, bromine, and iodine are very soluble whereas calcium fluoride is insoluble. Another striking difference is in the compounds with oxygen. Chlorine, bromine, and iodine all form analogous compounds with oxygen, but fluorine is seldom found combined with oxygen.

Classes of Compounds

In general, the compounds of fluorine are very stable. They may be divided into several general classes. The simplest form of combination gives the simple salts known as fluorides. The fluorides of practically all the metals are known, and their properties have been investigated. Fluorine also combines with most of the nonmetals, even fluorides of the other halogens being known. This makes possible many combinations of double or complex salts. When the fluoride of a nonmetal associates itself in a definite ratio with the fluoride of a metal, a double salt is formed. As an illustration, silica and hydrofluoric acid react to form silicon tetrafluoride, which is a gas at ordinary temperature and pressure. If silicon tetrafluoride is passed into an aqueous solution of sodium fluoride, an association takes place and a different salt, sodium fluosilicate, can be recrystallized from the solution:

$$2NaF + SiF_4 \longrightarrow Na_2SiF_6$$

There are many other illustrations of this double-salt formation in which the resulting compound has physical and chemical characteristics different from the original materials. Besides fluosilicates, there are fluoborates,

fluoaluminates, fluoarsenates, fluotitanates, fluovanadates, and many others. A practically complete list of the inorganic complex fluorides, together with original references is given in Gmelin's "Handbuch der anorganischen Chemie" (87)

Fluorine also combines with organic compounds in much the same way as do the other halogens, forming substituted ring compounds, addition compounds, and salts of organic bases.

Occurrence and Distribution

Fluorine occurs in a great many compounds widely distributed throughout the earth. It occurs in several natural minerals, among which are cryolite, cryolithonite, chiloite, ralstonite, tourmalines, pachnolite, apatite, sellaite, biolite, muscovite, fluor spar, and phosphate rock. In some of these the fluorine content is very low, while in others, such as cryolite and fluor spar, it is high. Most phosphate rock contains from 3 to 4 percent of fluorine.

Fluorine has been found in sea water (2) and in the water supplies of a great many cities and towns in the United States (244). It has also been found in a great variety of food products and mineral waters by Gautier and Clausmann (4, 6, 7, 8, 9), but their findings are open to question in view of the doubtful accuracy of their method. There is little question, however, in the light of later developments, that it occurs naturally in many food products.

Sources of Fluorine

Two common acids containing fluorine are easily prepared from the naturally occurring compounds.

When fluor spar or any other nonsiliceous fluoride is treated with sulfuric or other nonvolatile acid and the reaction mixture is heated, hydrogen fluoride distills off and may be dissolved in water to form aqueous hydrofluoric acid or condensed to the anhydrous hydrofluoric acid. Aqueous hydrofluoric acids containing about 48 to 60 percent HF and anhydrous hydrofluoric acid are available commercially. The reaction involved in its manufacture is expressed by the equation

$$CaF_2 + H_2SO_4 \longrightarrow 2HF + CaSO_4$$

Phosphate rock contains a double compound of calcium phosphate and calcium fluoride and in addition silicon dioxide, or sand. When this material is heated with sulfuric acid, as in the manufacture of phosphate fertilizer, reactions take place as follows: The calcium fluoride and sulfuric acid react to form hydrofluoric acid, which in turn reacts with the silica to form silicon tetrafluoride, which is evolved as a gas. These reactions are expressed by the equations

$$CaF_2 + H_2SO_4 \longrightarrow CaSO_4 + 2HF$$
$$4HF + SiO_2 \longrightarrow SiF_4 + 2H_2O$$

When the silicon totrafluoride is passed into water, it combines with it to form hydrofluosilicic acid:

$$3SiF_4 + 4H_2O \longrightarrow 2H_2SiF_6 + Si(OH)_4$$

Aqueous hydrofluosilicic acid containing about 35 percent H_2SiF_6 is available commercially.

These two common acids furnish convenient sources of fluorine for the manufacture of fluorine compounds.

REQUIREMENTS FOR INSECTICIDAL USE

In the development of new insecticides, especially for the control of insects affecting plants, two factors are of primary importance, the toxicity of the compound to the insect and the effect of the compound upon the plant. It is well known that compounds of high solubility, even though neutral in reaction, are harmful to vegetation if applied in appreciable quantities. This rules out a great number of the fluorine compounds, which are extremely soluble in water. Investigation reveals that only a few of the fluorides, a few of the fluosilicates, and some of the fluoaluminates are insoluble enough to be considered. (Roark (615) obtained a patent on fluorides having a solubility less than that of barium fluoride. Carter (189) presented a table of solubilities of the common fluosilicates and concluded that only three, those of barium, potassium, and sodium, were low enough in solubility to warrant a trial as field insecticides. The same author (190) also presented data on the solubilities of the fluoaluminates of the alkali metals.

For other uses, such as mothproofing, poison baits, etc., a higher solubility is permitted, which allows a wider choice of compounds. Many of the more soluble inorganic and organic fluorine compounds have been recommended for such purposes.

In the field of fumigation gaseous compounds of fluorine have found little or no application and have not been investigated to any extent. It is well known that fluorine, silicon tetrafluoride, sulfuryl fluoride, and others, even in very low concentrations, are very harmful to vegetation.

Another factor of some importance, especially where mixtures of insecticides or mixtures of insecticides with fungicides are to be employed, is the compatibility of the compounds comprising the mixture.

When the fluorine compounds were first recommended for use on field crops, hydrated lime was generally added to render the fluorine compounds harmless to foliage. Calcium fluoride was known to be insoluble, and it was soon found to be nontoxic to insects. The addition of lime to the fluorides or fluosilicates converts the fluorine to the inert calcium fluoride and thus decreases the insecticidal efficiency of these mixtures. Lime and lime-sulfur should therefore not be used with the fluorine compounds.

The compatibility of cryolite and of the fluosilicates with the arsenates was investigated by Carter (161). The results indicate that lead arsenate may be mixed in water with the fluosilicates of sodium, potassium, barium, and calcium without the formation of excessive amounts of soluble arsenic. The five other arsenates tested, namely, calcium, manganese, magnesium, aluminum, and barium, were largely decomposed by fluosilicates. Calcium, manganese, and barium arsenates were greatly decomposed when mixed with barium fluosilicate in water. The presence of cryolite seemed to inhibit the formation of soluble arsenic with all the arsenates used.

The incompatibility of nicotine sulfate and barium fluosilicate was reported by Chamberlain (324). This incompatibility was explained (322) on the basis of the reactions that may be expected, in which barium sulfate is precipitated and the soluble nicotine fluosilicate is formed.

In general, the fluorine compounds are compatible with inert diluents, such as sulfur, talc, diatomaceous earth, etc.

VALUE AS INSECTICIDES

One of the first references to the use of fluorine compounds as insecticides was a British patent granted to Higbee (1) in 1896 on the use of the soluble compounds of fluorine for destroying roaches and other insects in buildings and on vessels. Sodium fluosilicate, ferric fluosilicate, hydrofluosilicic acid, and the borofluosilicates were mentioned. Evidently little use was made of this information for several years.

The first official recommendation of the use of sodium fluoride for roaches was made in a bulletin by Marlatt in 1915 (10). In a revision of this bulletin, issued in 1928, the use of sodium fluosilicate was also recommended. The experimental results on which this recommendation was made were published in 1918 (30).

Sodium fluoride was recognized as having definite insecticidal value for certain purposes (3) and was recommended during the next few years (1915-19) for the control of cockroaches, termites, ants, clothes moths, chicken lice, horse lice, etc. (11, 13-31). By 1919 it had become generally recognized as an effective roach powder, ant poison, and poultry-lice exterminator.

About this time Gautier and Clausmann (9) studied the effect of fluorine on vegetation. They incorporated fluorine in artificial soil and determined its influence by measuring the height of the plant and, when seed was produced, the weight of seed. Small amounts of fluorine exerted a favorable influence on several plants. The same investigators had previously noted the presence of fluorine as a constituent of many plants and in tissues examined by them (12, 32, 33). Unfortunately,

their method of analysis was none too reliable for very small amounts of fluorine, and their figures for the natural fluorine content of fruits and vegetables might also be questioned. This matter becomes of importance later in the consideration of the amounts of fluorine allowable as spray residues. Undoubtedly soil, climate, fertilizers, irrigation, and other factors influence the natural fluorine content of fruits and vegetables, and a thorough study should be made of this question.

During the next few years (1920-24) several investigators reported their results with sodium fluoride and a few other fluorine compounds against insects (35-61). A new field for fluorine insecticides was opened up in 1924 (62-66), when they were tested against insects affecting field crops. Marcovitch (62,63) was one of the pioneers in this development. He reported favorable results with a number of compounds, including sodium fluosilicate, sodium fluoride, calcium fluoride, cryolite (natural and synthetic), calcium fluosilicate, and magnesium fluosilicate, against the Mexican bean beetle, the cotton boll weevil, the Colorado potato beetle, the potato flea beetle, the bean leaf beetle, the cucumber beetle, and the tobacco hornworm.

During the next 11 years (1925-35) all the commercially available fluorine compounds were tested extensively against insects affecting field crops (67 et seq.).

PRESENT STATUS OF FLUORINE COMPOUNDS AS INSECTICIDES

The fluorides proved to be unsatisfactory insecticides when used as sprays and dusts. In general, as powders they were too dense for satisfactory dusting. Also the insoluble ones, such as calcium and magnesium fluorides, were not sufficiently toxic. The more soluble compounds, such as sodium fluoride, caused severe burning of foliage when applied as dusts or sprays.

At the present time sodium fluoride finds considerable application as an ingredient of roach powders, ant poisons, lice exterminators, wood preservatives, etc., but none of the fluorides are recommended or used for the control of insects affecting field crops, except in poison-bran baits.

Several of the fluosilicates showed satisfactory toxicity to the boll weevil, the codling moth, the Mexican bean beetle, the cucumber beetle, and other chewing insects. However, solubility proved to be a determining factor in their safeness on foliage. Barium, potassium, and sodium fluosilicates are the least soluble and under certain conditions have proved harmless and effective. In general, sodium fluosilicate is too soluble to be used, and the potassium compound is not recommended for economic reasons, but the barium compound is recommended for certain uses. Sodium fluosilicate is used extensively as a moth-proofing agent and as a constituent of poison baits.

Calcium fluosilicate has been recommended for some uses, but the commercial "calcium fluosilicate compound" is not pure calcium fluosilicate but a complex calcium fluophosphate silicate (320).

The fluoaluminates, of which sodium fluoaluminate (cryolite) is the most common, have also been investigated thoroughly. Sodium fluoaluminate is available commercially as a finely divided powder of high purity. Both synthetic and natural cryolite are available. The powder suspends well in water and can be sprayed with the same equipment that is used for lead arsenate. It is not so satisfactory as a dust unless mixed with diluents. It is toxic to chewing insects, such as the codling moth, the walnut husk fly, etc., when applied as a spray, but some sticker, such as fish oil, should be added. Cryolite has been used extensively against the codling moth in some of the apple districts of the Pacific Northwest. Although giving good control of this insect, it cannot be recommended unless means are also provided for removal of the residue. Cryolite has also been used in the control of the walnut husk fly and against certain insects on vegetables.

Potassium fluoaluminate likewise proved to have satisfactory toxicity to chewing insects and to be safe on foliage under the proper conditions, but it is more expensive than the sodium compound.

Several other fluoaluminates showed toxicity to chewing insects in laboratory tests, but they have not attained any commercial importance.

Very little, if any, work has been done in testing the other classes of double and complex compounds of fluorine for use on field crops, because of economic reasons or because a knowledge of their properties indicates they would not be suitable for such purposes. Many of them, including organic compounds, have been patented for mothproofing uses.

TOLERANCE AS SPRAY RESIDUE

When experimental work was begun, there was no evidence that fluorine spray residues were a health hazard. However, the evidence linking the fluorine in the water supplies in certain areas with the condition of the teeth known as mottled enamel (293, 294, 369, 513, 514) led to investigation of the possibility of chronic fluorine intoxication from spray residues. Feeding experiments demonstrated that the ingestion of very small amounts of fluorine over long periods was harmful to animals. The physiological effects ranged from microscopic defects in the enamel of the teeth due to very small amounts of fluorine in the daily ration to such serious effects as impairment of the appetite, cachexia, interference with growth and reproduction, and even death with larger amounts. The information relating to chronic fluorine intoxication has been reviewed by McEds (389,390, 463).

Because of the health risk, the Secretary of Agriculture announced, on June 20, 1933, a maximum tolerance of 0.01 grain of added fluorine per pound of foodstuffs shipped in interstate commerce. This tolerance is still in effect. It is the same as that for arsenic trioxide.

SPRAY-RESIDUE REMOVAL

As several cover sprays of cryolite or barium fluosilicate on apples or pears, especially in the semiarid irrigated sections, leave a residue several times larger than the tolerance allowed, an investigation of the methods of cleaning was necessary.

Very efficient methods of removing lead and arsenic residues from fruits have been developed, and these were tried for the removal of fluorine. Contrary to expectations, cryolite and barium fluosilicate residues were found difficult to remove by many of the more efficient procedures for lead.

Several investigations on fluorine residue removal have been reported (385, 395, 459, 507, 508, 525, 544, 550, 575). The results indicate that a brush or a double-process washing machine is the most satisfactory, that hydrochloric acid, possibly with the addition of boric acid or aluminum sulfate, is the best washing solution, and that residues from two or perhaps three cover sprays of cryolite can be satisfactorily removed by the more efficient washing procedures used in the apple-raising sections of the Pacific Northwest.

The removal of fluorine residues from vegetables has not been investigated. Amounts in excess of the tolerance have been found on some vegetables that had been sprayed or dusted with these compounds during the growing season.

METHODS OF ANALYSIS

For the analysis of the insecticidal materials or other materials high in fluorine, several methods with various modifications have been used. They may be mentioned here only briefly.

(1) The calcium fluoride method, in which the fluorine is precipitated as the insoluble calcium fluoride and then weighed quantitatively.

(2) The lead fluochloride method, in which the fluorine is precipitated as the insoluble lead fluochloride and then weighed quantitatively or the chloride determined volumetrically by a Volhard titration.

(3) The Berzelius method, in which the fluorine is converted to the insoluble potassium fluosilicate and then determined either gravimetrically or volumetrically.

(4) The Offerman method, in which the fluorine is evolved as silicon tetrafluoride from boiling anhydrous sulfuric acid, dissolved in water, and titrated with standard alkali.

Each of these methods has certain advantages, and many modifications have been developed to make them applicable to different kinds of materials. The choice depends on the other materials present.

Analyses of apples for fluorine spray residue developed the fact that none of these methods were sensitive enough for that purpose or for the determination of fluorine occurring naturally in fruits and vegetables or in water supplies in those areas in which mottled enamel of teeth was endemic. This was especially true of spray residues in which the fluorine was intimately associated with a large amount of organic matter.

In 1933 a method for the determination of fluorine in plant materials was suggested by Willard and Winter (448). This method consisted of drying and ashing with a fixative such as lime, distilling the ash with perchloric acid, and titrating the fluorine in the distillate with thorium nitrate, using the zirconium lake of alizarin as an indicator. This method has been modified considerably by subsequent investigators, but distillation is still a necessary step in the separation of fluorine from interfering elements or large amounts of organic matter.

In an attempt to speed up the analysis of spray residues on apples, the U. S. Food and Drug Administration (608) recommended the substitution of a "mushing" procedure for the drying and ashing. In their procedure the apple peelings are refluxed with dilute sulfuric acid and aliquots are then distilled according to the Willard and Winter procedure.

The determination of the fluorine in the distillate from such procedures has also been given considerable attention. Wichman and Dahle (447a) thoroughly investigated the method of Merwin and Steiger and specified the conditions under which the greatest accuracy is attainable. This method is based on the bleaching effect of the fluorine ion on peroxidized titanium.

Another colorimetric method that has been recommended for the determination of small amounts of fluorine depends upon the bleaching action of fluorine on the red ferric thiocyanate. This method has been investigated by Foster (396), but has not been applied to the determination of spray residues.

Various modifications of all these methods have been recommended for the determination of small mounts of fluorine, but the method most widely used in spray residue work is the "mushing" procedure followed by the colorimetric method of Merwin and Steiger as modified by Wichman and Dahle and the Food and Drug Administration.

B I B L I O G R A P H Y

(1) Higbee, C. H.

1896. An improved composition or material for destroying insects. British patent 8236; applied for April 18, accepted May 23.

The compounds of fluorine employed for destroying insects were certain soluble ones, viz., sodium fluoride, ferric fluoride, the silicofluorides of the same bases, hydrofluosilicic acid, and the borofluosilicates.

(2) Carles, P.

1907. Le fluor dans les eaux minerales. Jour. Pharm. et Chim. [6] 25:228-236.

Gives data on the occurrence of fluorine in mineral waters.

(3) Hickey, C. H.

1911. The danger of fatal poisoning from roach and other insect powders containing sodium fluoride. Mass. Bd. Health Monthly Bull. 6:341-343.

Sodium fluoride is recognized as the active ingredient of insect powders. Two deaths and several cases of poisoning from the mistaken use of insect powders containing sodium fluoride are reported. Several samples that did not bear poison labels contained from 16 to 62 percent of sodium fluoride.

(4) Gautier, A.

1913. Le fluor est un élément constant des émanations du noyau terrestre, Comp. Rend. Acad. Sci. [Paris] 157:[illegible].

Fluorine is found to be a constituent of all the products emanating from the center of the earth.

(5) Nowotny, R.

1913. Erfahrungen aus den Praxis der Holzimpragnierung mit Fluoriden. Ztschr. Angew. Chem. 26 (Aufsatz):694-700.

A series of experiments conducted since 1909 is described, in which sodium fluoride was used to impregnate wood as a protection against dry rot. Tables show the results of impregnation with solutions of zinc fluoride, zinc chloride, copper sulfate, sodium fluoride, and mixtures of zinc chloride and sodium fluoride.

(6) Gautier, A.

1914. Sur le rôle et l'état du fluor dans l'économie animale. Compt. Rend. Acad. Sci. [Paris] 158:159-166.

The role and state of combination of fluorine in animal economy are discussed.

(7) Gautier, A., and Clausmann, P.

1914. Le fluor dans les eaux douces. Compt. Rend. Acad. Sci. [Paris] 158:1689-1695.
Fluorine was found in a great many samples of potable waters.

(8) Gautier, A., and Clausmann, P.

1914. Le fluor dans les eaux minérales. Compt. Rend. Acad. Sci. [Paris] 158:1631-1640.
Fluorine was found in a great many mineral waters.

(9) Gautier, A.

1915. Influence du fluor sur la végétation. Compt. Rend. Acad. Sci. [Paris] 160:194-195.
The influence of fluorine in the soil on vegetation is discussed.

(10) Marlatt, C. L.

1915. Cockroaches. U. S. Dept. Agr. Farmers' Bull. 658, 15 pp.
Sodium fluoride is recommended for the control of roaches.

(11) Shafer, G. D.

1915. How contact insecticides kill. Mich. Agr. Expt. Sta. Tech. Bull. 21:435-498.
Sodium fluoride may act on cockroaches by sticking fast in exudations of the body and becoming partly dissolved and then absorbed through the integuments. The roaches also swallow some of the material while licking and cleaning themselves.

(12) Gautier, A., and Clausmann, P.

1916. Le fluor dans le règne végétal. Compt. Rend. Acad. Sci. [Paris] 162:105-112.
The fluorine content of a great many fruits and vegetables was determined.

(13) Gibson, A.

1916. The control of ants in dwellings. A new remedy. Canad. Ent. 48:365-366.
The common carpenter ant (Camponotus pennsylvanicus) was controlled by dusting sodium fluoride powder into the openings between the beams and roof and other openings by means of a puffer or dust gun. The same experiment was tried in another locality against the shed-builder ant (Cremastogaster lineolata) with equal success.

(14) Holt, J. J. H.

1916. The cockroach, its destruction and dispersal. A comparison of insecticides and methods. Lancet [London] 190:1136-1137.
Sodium fluoride was found to be effective against the cockroach Periplaneta orientalis.

(15) New York State Museum.

1916. Thelydrias contractus Mots. N. Y. State Ent. Ann. Rept. 31 (N. Y. State Mus. Bull. 186):88.
A number of larvae were recorded from New York, where they occurred in household articles and clothing, except woolen garments. The use of sodium fluoride was recommended for combating them.

(16) Phelps, S.

1916. Sodium fluoride as a fly poison. U. S. Pub. Health Serv., Hyg. Lab. Bull. 108, 37 pp.
Tests showed sodium fluoride to be an effective muscicide, but because of its poisonous nature it was discarded in favor of formaldehyde and sodium salicylate.

(17) Snyder, T. E.

1916. Termites, or "white ants," in the United States: Their damage and methods of prevention. U. S. Dept. Agr. Bull. 333, 32 pp.
The use of sodium fluoride against termites is recommended. A 2-percent solution will give protection to wood-pulp products.

(18) United States Department of Agriculture, Bureau of Entomology.

1916. Poultry pests. U. S. Dept. Agr. Bur. Ent. Ann. Rept. 1916:11.
Sodium fluoride was found to be effective against several species of chicken lice.

(19) Bishopp, F. C.

1917. Some problems in insect control about abattoirs and packing houses. Jour. Econ. Ent. 10:269-277.
Sodium fluoride is recommended as an efficient control of cockroaches in storage rooms.

(20) Bishopp, F. C., and Wood, H. P.

1917. Mites and lice on poultry. U. S. Dept. Agr. Farmers' Bull. 801, 26 pp.
Sodium fluoride is recommended as being cheap and effective in destroying poultry lice.

(21) Bishopp, F. C., and Wood, H. P.

1917. Preliminary experiments with sodium fluoride and other insecticides against biting and sucking lice. Psyche 24:187-189.

Sodium fluoride as a dust and dip killed all stages of biting lice infesting cattle, horses, and other domestic animals. On dogs heavily infested with Trichodectes latus Nitzsch all lice were destroyed by 1 oz. of sodium fluoride in 1 gal. of water.

(22) Canada Department of Agriculture.

1917. Insects affecting household and public health. Canada Dept. Agr. Dominion Ent. Rpt. 1917, pp. 15-16.

Sodium fluoride is considered a very promising insecticide for the control of household insects, including the ants Camponotus pennsylvanicus and Cremastogaster lineolata and the silverfish (Lepisma saccharina).

(23) Hall, M. C.

1917. Notes in regard to horse lice, Trichodectes and Haematopinus. Jour. Amer. Vet. Med. Assoc. 51:494-504.

The effectiveness of sodium fluoride when rubbed into the hides and coats of horses infested with biting lice (Trichodectes pilosus and T. parumpilosus) is reported.

(24) Illingworth, J. F.

1917. Economic aspects of our predaceous ant. Hawaii Ent. Soc. Proc. 3:349-368.

The use of sodium fluoride against ants is reported.

(25) Jackson, A. C., and Lefroy, H. M.

1917. Some fly poisons for outdoor and hospital use. Bull. Ent. Research 7:327-335.

The results of investigations in Mesopotamia are reported, which show that sodium, and ammonium fluoride and bifluoride and potassium fluoride may be used to advantage as fly poisons.

(26) Ontario Department of Agriculture.

1917. Household insects. Ent. Soc. Ontario Ann. Rpt. 47:17.

The common carpenter ant (Camponotus pennsylvanicus Deg.), the shed-builder ant (Cremastogaster lineolata Say), and the German cockroach (Blattella germanica L.) were controlled in houses by dusting with sodium fluoride.

(27) Ontario Department of Agriculture.

1917. [Silverfish] Ontario Agr. Col. Ann. Rept. 43:19.

Sodium fluoride was reported to be very efficient against Silverfish (Lepisma sp.) and cockroaches.

(28) Fitch, C. P.

1918. Animal parasites affecting equines. Jour. Amer. Vet. Med. Assoc. 53:312-330.

Sodium fluoride was very efficient against biting lice (Trichodectes pilosus and T. equi (parumpilosus) on horses, but was of no value against sucking lice (Hematopinus macrocephalus (asini).

(29) Hall, M. C., and Wigdor, M.

1918. Notes on the acanthocephalid and arthropod parasites of the dog in North America. Jour. Amer. Vet. Med. Assoc. 53:493-500.

Sodium fluoride was an effective remedy against the biting dog louse (Trichodectes latus), but the possibility of ingestion of poison by dogs through licking of the hair and skin must be kept in mind.

(30) Scott, E. W., Abbott, W. S., and Dudley, J. E., Jr.

1918. Results of experiments with miscellaneous substances against bedbugs, cockroaches, clothes moths and carpet beetles. U. S. Dept. Agr. Bull. 707, 36 pp.

The efficiency of sodium fluoride in the control of some of these insects is indicated.

(31) Walter, E. V.

1918. Experiments on cockroach control. Jour. Econ. Ent. 11:424-429.

Sodium fluoride which had been used for killing roaches was much higher priced than boric acid.

(32) Gautier, A., and Clausmann, P.

1919. Influence des fluorures sur la végétation: A. Essais préliminaires en vases de jardin. Compt. Rend. Acad. Sci. [Paris] 168:976-982.

A study of the influence of fluorides in the soil on the growth of vegetation.

(33) Gautier, A., and Clausmann, P.

1919. Action des fluorures sur la végétation: B. Cultures en champ d'expériences. Compt. Rend. Acad. Sci. [Paris] 169:115-122.

A study of the influence of fluorides in the soil on vegetables and field crops.

(34) Wood, H. P.

1919. The depluming mite of chickens: its complete eradication from a flock by one treatment. Jour. Econ. Ent. 12:402-404.

Sodium fluoride, sulfur, and soap proved to be a complete control for mites as well as lice.

(35) Lloyd, L.

1920. The habits of the glasshouse tomato moth, Hadena (Polia) oleracea, and its control. Ann. Appl. Biol. 7:88-102.

Traps containing sodium fluoride are recommended for the control of the tomato moth.

(36) Lloyd, L.

1920. The glasshouse tomato moth and its control. Nursery and Mkt. Garden Indus. Develpmt. Soc., Ltd., Ann. Rept. 5:i-viii.

Traps containing a bait consisting of 1 part thick brown treacle, 2 parts ale, and 1 percent sodium fluoride are recommended for the control of the tomato moth.

(37) Wille, J.

1920. Biologie and Bekämpfung der deutschen Schabe (Phyllodromia germanica L.) Monog. Angew. Ent. No. 5, 140 pp.

Sodium fluosilicate is often employed for indoor use against cockroaches.

(38) Wöber, A.

1920. Über die Giftwirkung von Arsen-, Antimon- und Fluorverbindungen auf einige Kulturpflanzen. Angew. Bot. 2:161-178.

Scarlet runner and seedling peas were most easily affected, while barley, wheat, oats, maize, and rye were less sensitive. Sodium fluoride was harmful when present to the extent of 0.10 percent in the soil. A 1-percent solution of sodium fluoride used as a spray burned the young foliage.

(39) Zacher, F.

1920. Schaben als Schädlinge in Gewächshäusern. Gartenflora 69: 165-168.

Against cockroaches in greenhouses a mixture of equal parts of sodium fluoride and flour was found to give excellent results.

(40) Cobenzl, A.

1921. Kieselfluorsalze. Chem. Ztg. 45:1116.

The presence of sodium, potassium, and ammonium fluosilicates in insect and rat poisons is reported.

(41) Kadocsa, G.

1921. A csótányokról Állattani Közlemények 20:27-37
A historical account of roaches found in Hungary and a recommendation that sodium fluoride be used for their control.

(42) McDaniel, E.

1921. The silver fish (Lepisma spp.); the habits and control of this troublesome household pest. Mich. Agr. Col. Quart. Bull. 4:62-64.
Sodium fluoride was on the whole the most successful insecticide in the control of silverfish (Lepisma saccharina and L. domestica).

(43) Sertz, H.

1921. Ueber die Wirkung von Fluorwasserstoff und Fluorsilizium auf die lebende Pflanze. Tharandter Forstl. Jahrb. 72:1. [Abstract in Centibl. Bakt. [etc.] 55:373. 1922.]
The action of hydrogen fluoride and silicon tetrafluoride as fumigants was studied. These materials injured plants severely and were unsuitable for this purpose.

(44) Union of South Africa Department of Agriculture.

1921. Sodium fluoride. Union So. Africa Dept. Agr. Jour. 3:111.
Purchasers of sodium fluoride for use against roaches were warned against an adulterated form containing as much as 60 percent of common salt.

(45) Woglum, R. S., and Borden, A. D.

1921. Control of the Argentine ant in California citrus orchards. U. S. Dept. Agr. Bull. 965, 43 pp.
Sodium fluoride was found to be repellent to Argentine ants (Iridomyrmex humilis Mayr.).

(46) Boyd, J. E. M.

1922. The botany and natural history of the dyke lands near Sandwich, Kent, as far as they concern medical entomology. Jour. Roy. Army Med. Corps. 38:41-47, 117-130.
Sodium fluoride was not so effective against flies (Muscidae and Anthomyidae) as some other compounds. For use on manure heaps ammonium fluoride was suitable and less poisonous.

(47) Clarke, W. T.

1922. Ant control on shipboard. Jour. Econ. Ent. 15:329-333.
Experiments on the control of ants (Monomorium (Parholcomyrmex) destructor Jord.) on shipboard are reported. A powder consisting of 6 parts (by volume) sodium fluoride, 2 parts pyrethrum powder, and 2 parts cornstarch was very effective.

(48) McDaniel, E.

1922. Cockroaches, methods of exterminating this troublesome pest. Mich Agr. Expt. Sta. Quart. Bull. 5:38-39
Sodium fluoride was recommended as being the best method for destroying this pest, and mention was made that it is poisonous to man.

(49) Oregon Agricultural Experiment Station.

1922. The European earwig. Oreg. Agr. Expt. Sta. Bien. Rept. 1921-22:77.
A poison bran bait containing sodium fluoride was found very effective against the European earwig.

(50) Pierce, W. D.

1922. Some milk goat problems observed in California. Calif. State Bd. Agr. Spec. Pub. 22, 13 pp.
Biting lice (Trichodectes climax Nitsch) may be controlled by dusting with dry sodium fluoride powder. Sodium fluoride may also be used as a wet dip.

(51) Wells, R. W., Bishopp, F. C., and Laake, E. W.

1922. Derris as a promising insecticide. Jour. Econ. Ent. 15:90-95.
A dust composed of equal parts of sodium fluoride and derris powder completely controlled the cattle lice Trichodectes scalaris and Linognathus vituli L.

(52) Wood, H. P.

1922. Eradication of lice on pigeons. U. S. Dept. Agr. Dept. Cir. 213, 4 pp.
It is recommended that each bird be dipped in a solution of 1 oz. sodium fluoride and 3/4 oz. hard laundry soap in 1 gal. water, until soaked to the skin. Dusting with sodium fluoride gave a high degree of control but not complete eradication. These treatments were effective against Liperus baculus N. and Goniocotes compar N.

(53) Caesar, L.

1923. The feather mite - a new pest of poultry. Ent. Soc. Ontario Ann. Rpt. 53:47-48.

A dust of 1 part sodium fluoride and 2 parts sulfur for the control of the feather mite (Liponyssus bursa) on chickens was recommended.

(54) Fulton, B. B.

1923. Some experiments on poison baits for the European earwig. Jour. Econ. Ent. 16:369-376.

Experiments to discover the best poison baits for the European earwig (Forficula auricularia) showed that sodium fluoride was equal or superior in toxicity to arsenious oxide and acted more quickly. A bait consisting of wheat bran wet with a mixture of equal volumes of sodium fluoride solution (1 oz. in 4 oz. of water), glycerin, and molasses was recommended. The bait contained about 8 oz. of poison to 4 lbs. of bran.

(55) Matthes, H., and Brause, G.

1923. Uber die Verwendung von Silicofluoriden als Ungeziefermittel und die Zusammensetzung von Uba, Styxol, Nicoschwab und Tanatol. Pharm. Ztg. 68:227-228.

Attention is called to the danger involved in the unrestricted sale and indiscriminate use of soluble fluosilicates, especially sodium fluosilicate, now extensively used in the eradication of rats, mice, roaches, etc.

(56) Nowotny, R.

1923. Über praktische Erfahrungen bei der Holzkonservierung mit Fluoriden. Ztschr. Angew. Chem. 36:439-440

The results of practical experiments on wood preservation with sodium fluoride and zinc fluoride are summarized. These compounds are very effective in wood preservation.

(57) Anonymous.

1924. Dr. Dittmar's Dinol Rattentod. Pharm. Ztg. 69:190

Sodium fluosilicate was reported to be present to the extent of 92 percent in a German vermin killer.

(58) Anonymous.

1924. Fluor-Präparat der Fluax Werke Dresden 16. Pharm. Ztg. 69:190.

A German rat poison was found to consist of 25 percent sodium fluosilicate, 35 percent calcium carbonate, and the remainder apparently pine sawdust (? Nadelholzmehl).

(59) DeOng, E. R.

1924. Toxicity of sodium fluoride to man. (Sci. Note) Jour. Econ. Ent. 17:343-344.

Several instances of accidental poisoning by sodium fluoride are reviewed. This is important because of the increasing use of sodium fluoride for the control of pests such as cockroaches and ants in the home. Soluble fluorine compounds are toxic even in doses of 1 mg per kg (0.06 g. for a 160-lb. man) and should be absent from the food of man and animals.

(60) Hargreaves, E.

1924. The action of some organic compounds when used as stomach poisons for caterpillars. Bull. Ent. Research 15:51-56.

The high toxicity of barium and calcium fluoride and the possibilities of the use of fluor spar as an insecticide are pointed out. The compounds were tested on larvae of Pieris rapae and Spilosoma lubricipeda.

(61) Kennard, D. C.

1924. Chicken lice and mites. Ohio Agr. Expt. Sta. Monthly Bull. 9: 100-104.

The use of sodium fluoride against chicken lice and mites was recommended, either by dipping in a solution of 1 oz. of sodium fluoride per gallon of warm water or by dusting with sodium fluoride.

(62) Marcovitch, S.

1924. Sodium fluosilicate as an insecticide. Indus. and Engin. Chem. 16:1249.

Cryolite and sodium fluosilicate were found to be effective against chewing insects. Sodium fluosilicate did not cause burning when mixed with lime but did burn without the lime.

(63) Marcovitch, S.

1924. New insecticides for the Mexican bean beetle and other insects. Tenn. Agr. Expt. Sta. Bull. 131, 19 pp.

Sodium fluosilicate, sodium fluoride, calcium fluosilicate, and magnesium fluosilicate were tested against the Mexican bean beetle. Very satisfactory toxicity of these compounds against chewing insects were reported.

(64) Nursery and Market Garden Industries' Development Society, Ltd.

1924. Woodlice (Oniscoidea). Nursery and Mkt. Gard. Indus. Devlpmt. Soc., Ltd., Expt. and Res. Sta., Ann. Rept. 9:78-81.

Sodium fluoride had no effect on cucumber-house wood lice (Armadillidium speyeri Jackson) when used in baits.

(65) Ripley, L. B.

1924. Sodium fluoride as an insecticide; its possibilities as a locust poison. Bull. Ent. Research 15:29-34; also Union So. Africa Dept. Agr. Jour. 9:458.

Sodium fluoride was found to be effective as a stomach poison against cutworms and brown locusts.

(66) Warburton, C.

1924. Zoologists report. Livestock Jour. [London]. 100:448.

Sodium fluosilicate was reported to be very effective against slugs and cabbage caterpillars.

(67) Baerg, W. J.

1925. Control measures for blister beetles. Ark. Agr. Expt. Sta. Bull. 201, 8 pp.

Sodium fluosilicate was tested against the striped, gray, margined, and black blister beetles (Epicauta lemniscata F. Macrobasis unicolor (Kby.), E. marginata F., and E. funebris Horn.). Mixed with an equal quantity of hydrated lime it destroyed all beetles in 48 hours and caused no appreciable injury to soybeans or alfalfa. It was also used safely on potatoes and tomatoes, but clematis vines were severely scorched. Calcium fluosilicate compound may also be used, but without dilution.

(68) Brittain, W. H.

1925. Experiments in the control of head lice (Lipeurus heterographus Nitzsch) on young chicks, 1924. Acadian Ent. Soc. Proc. 10:41-42.

Sodium fluoride dry and as a dip gave good control and was in no way injurious to the birds.

(69) Holloway, T. E., Haley, W. E., and Ingram, J. W.

1925. The application of sodium fluosilicate by airplane in an attempt to control sugarcane moth borer. U. S. Dept. Agr. Cir. 45, 8 pp.

Very good control of the borer (Diatraea saccharalis Fab.) and no injury to the sugarcane are reported.

(70) Kerr, A. P., and Smith, C. E.

1925. Toxicity of sodium silicofluoride and arsenical mixtures to plant foliage. U. S. Dept. Agr. Off. Rec. 4(48):5.

A mixture of equal parts of calcium arsenate and sodium fluosilicate in distilled water formed 87.8 to 93.8 percent soluble arsenic of the total amount of arsenic present. Equal parts of lead arsenate and sodium fluosilicate is distilled water formed 1.5 percent soluble arsenic.

(71) Louisiana Agricultural Experiment Station.

1925. Sugar cane borer. La. Agr. Expt. Sta. Ann. Rept. 1925:24-25.
Application of sodium fluosilicate by plane gave prosising results in the control of the sugarcane borer. No serious burning of the cane resulted.

(72) Marcovitch, S.

1925. Promising plant insecticides. Science (N.S.) 61:22
Refers to same experimental work as succeeding abstract.

(73) Marcovitch, S.

1925. Non-arsenicals for chewing insects. Jour. Econ. Ent. 18:122-128
Sodium and calcium fluosilicates and cryolite were very effective against the Mexican bean beetle (Epilachna corrupta) and the cotton boll weevil (Anthonomus grandis). The potato beetle (Leptinotarsa decemlineata), potato flea beetle (Epitrix cucumeris), bean leaf beetle (Ceratoma trifurcata), cucumber beetle (Diabrotica vittata) and tobacco hornworm (Protoparce quinquemaculata) could be readily killed with a mixture of 1 part of sodium fluosilicate and 9 parts of lime (by volume). Undiluted sodium fluosilicate caused injury to plants.

(74) Marshall, J.

1925. The striped cucumber beetle (Diabrotica vittata Fab.). Ent. Soc. Ontario Ann. Rept., 56:80-83.
Experiments with over 60 dusts, sprays, fumigants, and baits are reported. Sodium fluosilicate and lime (1:9) gave good control, was satisfactory under damp conditions, and did not injure plants.

(75) Tattersfield, F., and Gimingham, C. T.

1925. Further experiments with sodium fluosilicate as an insecticide. Indus. and Engin. Chem. 17:323.
Sprays of potassium and sodium fluosilicate were toxic to larvae of Selenia tetralunaria Hufn.

(76) United States Department of Agriculture, Bureau of Entomology.

1925. Mexican bean beetle. U. S. Dept. Agr., Bur. Ent. Ann. Rept. 1925:20-21.
Sodium fluosilicate showed promise against the Mexican bean beetle.

(77) United States Department of Agriculture, Bureau of Entomology.

1925. Blister beetle (Epicauta lemniscata). U. S. Dept. Agr. Bur. Ent. Ann. Rept. 1925:24.
Against blister beetles, calcium arsenate plus equal amounts of sodium fluosilicate gave good results. Sodium fluosilicate alone also gave good control, but both alone and in mixtures this material caused some plant injury.

(78) United States Department of Agriculture, Bureau of Entomology.

1925. Twelve-spotted cucumber beetle. U. S. Dept. Agr., Bur. Ent. Ann. Rept. 1925:24.

Sodium fluosilicate was effective against the twelve-spotted cucumber beetle.

(79) Arkansas Agricultural Experiment Station.

1926. Blister beetles. Ark. Agr. Expt. Sta. Ann. Rept. 37 (Bull. 203):33-34.

Sodium fluosilicate and calcium fluosilicate dusts gave very good control of four species of blister beetle, Epicauta lemniscata, E. marginata, E. funebris, and Macrobasis unicolor, on soybeans.

(80) Arkansas Agricultural Experiment Station.

1926. Striped cucumber beetle. Ark. Agr. Expt. Sta. Ann. Rept. 37 (Bull. 203):38.

Sodium and calcium fluosilicates were the only insecticides capable of killing large numbers of striped cucumber beetles. Sodium fluosilicate caused foliage injury when applied alone but not when mixed with lime.

(81) California Agricultural Experiment Station.

1926. Control of cucumber beetles Calif. Agr. Expt. Sta. Rept. 1926:66.

Arsenicals and fluosilicate dusts were equally as effective for the control of the striped and twelve-spotted cucumber beetles. Gypsum was a better diluent than hydrated lime.

(82) Crumb, S. E.

1926. Tobacco cutworms and their control. U. S. Dept. Agr. Farmers' Bull. 1494, 14 pp.

Sodium fluoride in bran baits (1:50) with enough water to moisten is recommended for the variegated cutworm (Lycophotia margaritosa Haw. var. saucia Hbn.), the greasy cutworm (Agrotis ypsilon Rott.), the dingy cutworm (Feltia ducens Walk.), the clay-backed cutworm (F. gladiaria Morr.), and the dark-sided cutworm (Euxoa messoria Harr.).

(83) Edwards, W. H.

1926. Tobacco: Insect pests. Mauritius Dept. Agr. Gen. Ser. Bull. 33:28-29.

A poison bait of chopped cactus stems soaked for 24 hours in a 10-percent sodium fluoride solution will attract and poison caterpillars of Phytometra (Plusia) signata F., P. orichalcea F., Prodenia litura F., and Spodoptera mauritia Bdv.

(84) Gasow, H.

1926. Forstentomologische Untersuchungen. I.--Ergänzende Feststellungen an Tortrix Viridana L. II.--Versuche über die Wirksamkeit staubförmiger Chemikalien gegen die Raupe des Kiefernspanners (Bupalus piniarius L.). Arb. biol. Reichsanst. Land- u. Forstw., 15(1):75-98

Barium fluoride, sodium fluoride, and sodium fluosilicate proved effective as dusts against the pine moth (Bupalus piniarius L.).

(85) Gasow, H.

1926. Ergebnisse neuerer Untersuchungen über die Bekampfung des Wiesenwurms. Mitt. Deut. Landw. Gesell. 41:410-412.

Sodium fluoride (1:25-40) and sodium fluosilicate (1:25-50) in bran gave good control of larvae of Tipula spp. in pasture lands in Westphalia.

(86) Gentner, L. G.

1926. The mint flea beetle. Mich. Agr. Expt. Sta. Spec. Bull. 155, 13 pp.

Calcium fluosilicate compound applied undiluted in the form purchased (about 22 percent) gave good control of the mint flea beetle (Longitarsus menthaphagus Gentner) and adhered well to the foliage. A very satisfactory dust consisted of 10 to 20 lb. of calcium arsenate mixed with equal parts of calcium fluosilicate compound and talc to make 100 lb.

(87) Gmelin, L.

1926. Handbuch der anorganischen Chemie. Ed. 8, part 5, 86 pp. Leipzig-Berlin.

Fluorine and its compounds are discussed at length and many literature references are given.

(88) Guyton, F. E.

1926. Preliminary report on sodium fluoride as a control for cattle lice. Jour. Econ. Ent. 19:602-603.

Sodium fluoride rubbed into the hair gave good control of biting louse (Trichodectes scalaris), short-nosed ox louse (Haematopinus eurysternus), and long-nosed ox louse (H. vituli).

(89) Herrick, G. W.

1926. Some long standing and some more recent insect pests with hints on methods of control. N. Y. State Hort. Soc. Proc. 71:4-5.

Sodium fluosilicate was effective against the striped cucumber beetle and against blister beetles.

(90) Imes, M.

1926. Lice, mange, and ticks of horses and methods of control and eradication. U. S. Dept. Agr. Farmers' Bull. 1493. 32 pp.

Sodium fluoride applied as a powder or mixed with water controlled biting lice but did not eradicate sucking lice.

(91) Indiana Department of Conservation.

1926. Ants. Ind. Dept. Conserv. Ann. Rept. 7:45-46.

Satisfactory results in the control of the small red thief ant (Solenopsis melesta Say), the garden ant (Lasius niger americanus Emery), and the crazy ant (Prenolepis longicornis Latr.) were obtained by dusting with sodium fluoride.

(92) Ingram, J. W.

1926. Sodium fluosilicate as a control for blister beetles on soy beans in southwestern Louisiana. Jour. Econ. Ent. 19: 853-458.

Striped blister beetle (Epicauta lemniscata Fab.) on soybeans was controlled by sodium fluosilicate without injury to the foliage.

(93) Iowa Agricultural Experiment Station.

1926. Cutworms and army worms. Iowa Agr. Expt. Sta. Ann. Rept. 1924-1925

Sodium fluoride is a good substitute for Paris green in baits against cutworms and armyworms. Fowls were fed bran baits containing sodium fluoride in such amounts as to demonstrate that it can be used without danger to poultry.

(94) Langford, G. S.

1926. The possibilities of sodium fluosilicate as a poison in grasshopper baits. Jour. Econ. Ent. 19:670.

Sodium fluosilicate is effective in baits against grasshoppers mostly (Melanoplus femur rubrum De G.) and proved to be better than paris green, white arsenic, sodium arsenite, or sodium fluoride.

(95) Marcovitch, S.

1926. The control of the striped cucumber beetle. Tenn. Agr. Expt. Sta. Cir. 1, 2 pp.

One part commercial sodium fluosilicate to 2 parts hydrated lime or gypsum, calcium fluosilicate compound, or extra light sodium fluosilicate undiluted is recommended against these pests. There was some foliage injury to cucumbers, which they eventually outgrew.

(96) Marcovitch, S.

1926. Supplementary investigations of the fluosilicates as insecticides. Tenn. Agr. Expt. Sta. Bull. 134, 13 pp.

Fluosilicates were found especially effective against the striped cucumber beetle, blister beetles, and several flea beetles. Sodium fluosilicate gives promise of becoming a valuable material for the control of bacterial spot of peach (Bacterium pruni).

(97) Melander, A. L., and Spuler, A.

1926. Poisoned baits for strawberry root weevil. Wash. Agr. Expt. Sta. Bull. 199, 22 pp.

Against the strawberry root weevils Brachyrhinus sulcatus and B. ovatus L. sodium fluoride may be used in poison baits.

(98) Mills, J. E.

1926. Recommendations regarding boll weevil work. Jour. Econ. Ent. 19:601-602. [Abstract only.]

Barium fluoride, sodium fluosilicate, and cryolite seem to be as effective as calcium arsenate, on volume-for-volume basis, as a poison for boll weevil control.

(99) Mote, D. C., Wilcox, J., and Davis, E. G.

1926. The natural "cleaning up" habits of insects. Jour. Econ. Ent. 19:745-748.

Cleaning up habits of western spotted cucumber beetle (Diabrotica soror Leconte), German cockroach (Blattella germanica L.), European earwign (Forficula auricularia L.), Syneta leaf beetle (Syneta albida Leconte), and asparagus beetle (Crioceris asparagi L.) were stimulated by sodium fluoride and sodium fluosilicate.

(100) New York (Geneva) Agricultural Experiment Station.

1926. Study and control of cucumber beetles. N. Y. (Geneva) Agr. Expt. Sta. Ann. Rept. 45:42.

Sodium fluosilicate, pure or in dilutions of 1 to 5 parts of hydrated lime, against striped cucumber beetle caused severe injury to plant growth.

(101) Ontario Department of Agriculture.

1926. Grain mite. Ent. Soc. Ontario, Ann. Rept. 56:13.

Hydrated lime and sodium fluoride were reported to be ineffective against Tyroglyphus farinae.

(102) Osburn, M. R.

1926. Comparative tests with sodium fluosilicate and calcium arsenate for the control of the cotton boll weevil (Anthonomus grandis). Jour. Econ. Ent. 19:643-644.

Sodium fluosilicate proved to be more effective than calcium arsenate. Results show a slight, but not serious, scorching of plants.

(103) Ripley, L. B.

1926. Top-dressing of maize against stalk-borer. Results of tests. Farming in So. Africa 1:153-154.

Sodium fluosilicate as a dust gave satisfactory control but produced scorching.

(104) Roark, R. C.

1926. Fluorides vs. fluosilicates as insecticides. Science (N.S.) 63:431-432.

Arguments were presented that the fluorides were more effective than the fluosilicates, since the latter generally were converted to the fluorides.

(105) Sherwood, E. C.

1926. Control of the Mexican bean beetle. W. Va. Dept. Agr. Cir. 64 (Ext. Div. Col. Agr. Cir. 279), 4 pp.

Against Mexican bean beetle a dust of 1 part calcium fluosilicate to 3 parts hydrated lime is recommended.

(106) Smith, E. C., and Allen, N.

1926. Projects of investigations affecting truck crops in Louisiana. La. Agr. Expt. Sta. Ann. Rept. 1926, 120-122.

Against the tomato fruitworm (Heliothis obsoleta F.) moderate success was obtained with lead and calcium arsenates, but sodium fluosilicate was unsatisfactory, as effective strengths injured the plants.

(107) Smith, L. B.

1926. The Japanese beetle. N. J. State Dept. Agr. Ann. Rept. 11: 71-77.

As substitutes for lead arsenate in the control of Japanese beetle barium and potassium silicoflurides and lead fluoride show promise.

(108) South Carolina Agricultural Experiment Station.

1926. Corn bill-bug (Spenophorus maidis Chitt.) S. C. Agr. Expt. Sta. Ann. Rept. 39:35.

Against the corn bill-bug cage tests using line and sodium fluosilicate dust mixtures gave best results.

(109) Thompson, H. W.

1926. Leatherjackets and their control. Welsh Jour. Agr. 2:228-233.

Sodium fluoride in baits was not satisfactory against leatherjackets.

(110) Walker, H. W., and Mills J. E.

1926. Progress report of work of the Chemical Warfare Service on the boll weevil (Anthonomus grandis). Jour. Econ. Ent. 19:600-601. [Abstract only.]

Sodium fluosilicate, barium fluoride, and cryolite seem to be equally as effective as calcium arsenate on a volume-for volume basis.

(111) Anderson, H. W.

1927. The effect of sodium silicofluoride sprays on the peach and on the control of bacterial spot. Science 65 (N.S.):16-18.

After being sprayed with sodium fluosilicate the fruit ripened 4 to 6 days earlier than unsprayed fruit and had insipid and sometimes bitter taste. Flu-Sul (barium fluoride) gave the same effect. Little injury to leaves or tree resulted.

(112) Atwell, H. C.

1927. The european earwig (Forficula auricularia Linn.). Oreg. Bd. Hort. Bien. Rept. 19:86-103.

Poison baits containing sodium fluoride gave good control.

(113) Austin, G. D.

1927. Preliminary notes on the toxicity of some standard insecticides under Ceylon conditions. Ceylon Dept. Agr. Yearbook 1927:49-53.

Lead chromate, various arsenicals, and sodium fluosilicate were tested against various insects. As results were not conclusive, it was proposed to continue them for another year.

(114) Bremer, H., and Kaufmann, O.

1927. Die Bekämpfung der Rübenfliege (Pegomyia hyoscyami Pz.) mit Fluornatrium und Kieselfluornatrium. Anz. Schädlingskunde 3:13-15.

Sodium fluoride and sodium fluosilicate are excellent stomach poisons against P. hyoscyami and harmless to beets at strength required, viz, 0.4 percent solution containing 2.5 percent raw sugar.

(115) Cleveland, C. R.

1927. Stomach poisons for control of the squash vine borer (Melittia satyriniformis Hbn.). Jour. Econ. Ent. 20:135-143.

Reference is made to sprays containing lead arsenate and dusts of sodium fluosilicate and various arsenicals. Sodium fluosilicate and lime dusts gave relatively poor results, the degree of control depending to some extent on adhesiveness and thoroughness of application.

(116) Compton, C. C., and Flint, W. P.

1927. A suggestion for controlling the locust borer, Cyllene robiniae. Jour. Econ. Ent. 20:295-298.

Bands containing Tanglefoot mixed with sodium fluoride or with sodium arsenite killed all beetles coming in contact with them.

(117) Downes, W.

1927. Recent developments in strawberry root weevil control. Jour. Econ. Ent. 20:695-698.

The most recent method of control is the use of poison baits consisting of chopped evaporated-apple waste. Poisons used were sodium fluoride, sodium fluosilicate, and some arsenicals. All were effective, but sodium fluosilicate was the most satisfactory. A strength of 5 percent of the poison was found to give the best results.

(118) Drake, C. J., and Harris, H. M.

1927. The control of armyworms and cutworms. Iowa Agr. Expt. Sta. Cir. 101, 8 pp.

Against the armyworm (Cirphus unipuncta Haw.) and several species of cutworms, the following poison bait is recommended: 1 lb. sodium fluoride, 2 qts. cheap molasses, 20 to 25 lbs. wheat bran, 2 gal. water.

(119) Driggers, B. F.

1927. Calcium cyanide as a control for the cranberry root worm on cultivated blueberries. Jour. Econ. Ent. 20:267-270.

Experiments with sodium fluosilicate against the adult cranberry root worm (Rhabdopterus picipes Oliv.) failed to give a satisfactory kill.

(120) Eddy, C. O., and McAlister, L. C., Jr.

1927. The Mexican bean beetle. S. C. Agr. Expt. Sta. Bull. 236, 38 pp.

In low concentration in spray solutions sodium fluosilicate was high in toxicity and compared favorably with arsenical poisons, but in similar solution barium fluosilicate was lower than the arsenicals while calcium fluosilicate compound was still lower. Sodium fluosilicate and barium fluosilicate were the most toxic when used as dusts; calcium fluosilicate compound was less toxic but gave good results when used undiluted. Barium fluosilicate did not scorch either bean or cotton plants even when undiluted. Sodium fluosilicate scorched slightly when undiluted in dry weather or in small dilutions in humid weather. Calcium fluosilicate compound has never caused any injury.

(121) Eyer, J. R.

1927. Tests of some recently developed insecticides in control of the grape leaf hopper and oriental fruit moth. Jour. Econ. Ent. 20:253-260.

Control of grape leafhopper nymphs (Typhlocyba comes Say) was obtained with sodium fluosilicate with lime 10 + 10 to 100 gal. water, but some injury was caused to foliage. Mixtures of pyrethrum powder, sodium fluosilicate, and hydrated lime were effective against larvae of oriental fruit moth (Laspeyresia molesta Busck), but spray containing 10 lb. sodium fluosilicate and 20 lb. lime was most effective. Dusts were slightly less effective than sprays. Sodium fluosilicate was more quickly toxic than pyrethrum. In the field pyrethrum soap emulsions with bordeaux mixture and sodium fluosilicate-hydrated lime dusts were superior to nicotine and lead arsenates.

(122) Fleming, W. E.

1927. Fluosilicates as insecticides for the Japanese beetle. Jour. Econ. Ent. 20:685-691.

Solubilities in 1,000 parts of water are given for acid lead arsenate, and for the following fluosilicates: Barium, potassium, cadmium, calcium, sodium, copper, strontium, aluminum, and zinc. Fluosilicates were not compatible with bordeaux mixture, soap solution, or lime-sulfur. Apple, peach, and bean foliage were not injured by fluosilicates of barium, potassium, and sodium. Diluents studied were lime, talc, charcoal, clay, flour, and starch. Fluosilicates coated with lead oleate do not mix readily with water. The fluosilicates of barium, potassium, and sodium were about as toxic to the Japanese beetle as acid lead arsenate. Fluosilicates of cadmium, aluminum, and copper were not effective, whereas fluosilicates of strontium, zinc, and calcium were moderately effective.

(123) Gasow, H.

1927. Beitrag zur Bekämpfung des Weidenschädlings (Phyllodecta vulgatissima L.). Arb. Reichsanst. Land- u. Forstw. 15:271-295.

Arsenicals such as paris green and fluorine compounds such as barium fluoride, sodium fluoride, and sodium fluosilicate were excellent for control of the willow pest.

(124) Hinds, W. E., and Spencer, H.

1927. Airplane dusting for sugarcane borer control in Louisiana. Jour. Econ. Ent. 20:352-358.

Sodium fluosilicate gave fairly satisfactory control of the sugarcane borer (Diatraea saccharalis crambidoides Grote) when used at the rate of 20 lb. per acre. The slight burning was not serious.

(125) Hinds, W. E., and Spencer, H.

1927. Sugarcane borer control aided through utilization of infested and trap corn. La. Agr. Expt. Sta. Bull. 198, 26 pp.

Sodium fluosilicate gave fairly good control of the sugarcane moth borer (Diatrea saccharalis crambidoides Grote) in corn. Severe scorching of foliage occurred in almost every case. Ten percent hydrated lime decreased burning and decreased control. Percentage of kill increased during first week after application.

(126) Isely, D.

1927. The striped cucumber beetle. Ark. Agr. Expt. Sta. Bull. 216, 36 pp.

Sodium fluosilicate and calcium fluosilicate are the only insecticides that kill large numbers of the beetles (Diabrotica vittata F.) and protect the plant for several days. Occasional injury to the plant is caused by sodium fluosilicate even when the material is diluted with lime. Calcium fluosilicate compound containing about 20 percent of the insecticide was used and caused no injury.

(127) Jewett, H. H.

1927. The striped cucumber beetle. Ky. Agr. Expt. Sta. Cir. 37, 34 pp.

Sodium fluosilicate caused considerable scorching of foliage even when diluted at the rate of 1 lb. to 5 lbs. of lime, and gave a poor yield of cucumbers.

(128) Lyle, C.

1927. Cutworm control on overflowed land. Miss. State Plant Bd. Quart. Bull. 7(1):1-3.

Sodium fluosilicate may be used in poison baits against southern grass worm (Laphygma frugiperda).

(129) Lyle, C.

1927. Cutworm bait poison. Miss. State Plant Bd. Quart. Bull. 7(2):3-4.

Paris green was more toxic than sodium fluosilicate in tests on greasy cutworm, (Agrotis ypsilon), southern grass worm (Laphygma frugiperda), and yellow-striped armyworm (Prodenia ornithogalli).

(130) Mississippi State Plant Board.

1927. Sodium fluosilicate for poultry lice. Miss. State Plant Bd. Quart. Bull. 7(1):20.

Sodium fluosilicate is more effective than sodium fluoride and mercurial ointment, being both cheaper and more toxic to the parasites.

(131) Mote, D. C., and Wilcox, J.

1927. The strawberry root weevils and their control in Oregon. Oreg. Agr. Expt. Sta. Cir. 79, 24 pp.

Sodium fluoride and sodium fluosilicate were effective poisons in apple baits for the strawberry root weevils Brachyrhinus ovatus L. and B. rugifrons Gyll.

(132) Muggeridge, J.

1927. The European earwig: Its habits and control. Some recent experimental work in New Zealand. New Zeal. Jour. Agr. 34:395-401.

Baits with sodium fluoride were not so effective as those with white arsenic. Sodium fluosilicate used as a barrier around the base was not effective.

(133) Runner, G. A., and Eyer, J. R.

1927. Experiments in control of the rose-chafer, Macrodactylus subspinosus Fab., in vineyards. Jour. Econ. Ent. 20: 194-195.

Dusts of sodium fluosilicate and hydrated lime or talc were only slowly toxic, did not protect vines from feeding, and also burned foliage unless large quantities of diluent were used.

(134) Steinkopf, W.

1927. Über aromatische Sulfofluoride. Jour. Prakt. Chem. (n.s.) 117:1-82.

Aromatic sulfonyl fluorides are stable in the presence of water, acids, and ammonia.

(135) Wilson, C. C.

1927. Non-arsenicals for grasshopper control. Jour. Econ. Ent. 20:545.

Sodium fluoride and sodium fluosilicate mixed with hydrated lime or gypsum 1:5, 1:10, and 1:15 at 109° F. killed all grasshoppers except those on which sodium fluoride with hydrated lime 1:10 and 1:15 was used, in which cases 98 and 96 percent, respectively, were killed.

(136) Bachmann, W.

1929. A process of producing pure aluminium compounds suitable for the production of aluminium. British patent 307,345; issued May 1, appl. Feb. 25, 1929.

Aluminum fluorides or double alkali-metal aluminum fluorides are formed by treatment of an aluminum salt with alkali fluoride in solution or suspension.

(137) Baerg, W. J.

1928. Three shade tree insects. Ark. Agr. Expt. Sta. Bull. 224, 25 pp.

Fall webworm (Hyphantria cunea Dru.) attacks walnut, elm, maple, oak, and other shade and fruit trees. Yearly arsenical sprays decrease the damage, but after larvae are half grown no insecticide now in use is effective. Experiments have been conducted with sprays of lead and calcium arsenates, zinc arsenite, sodium fluosilicate, calcium fluosilicate compound, calcium cyanide, and cocotine, but none of the results were good enough to warrant further trials.

(138) Carter, R. H., and Roark, R. C.

1928. Composition of fluorides and fluosilicates sold as insecticides. Jour. Econ. Ent. 21:762-773.

Methods of analysis are given. The purity and the physical chemical data are given for 12 commercial samples of sodium fluoride, 11 of sodium fluosilicate, and several miscellaneous fluorides and fluosilicates. The effect of their physical condition on their insecticidal value and safeness for use on foliage is discussed.

(139) Frere, J.

1928. Les fluosilicates - leur emploi comme insecticides. Rev. Prod. Chim. [Paris] 31:880-884.

Gives methods of preparation, properties, and toxicity to insects, bacteria, plants, animals, and man, of several of the fluosilicates. Those mentioned are the fluosilicates of sodium, barium, aluminum, lead, magnesium, and copper.

(140) Fulton, B. B.

1928. Cockroach destruction in buildings. Iowa Agr. Expt. Sta. Cir. 112, 4 pp.

Remedial measures for Blattella germanica L., Blatta orientalis L., Periplaneta americana L., P. australasiae F., P. fuliginosa Serv. include dusting with sodium fluoride.

(141) Garman, P.

1928. The oriental peach moth in Connecticut. Conn. Agr. Expt. Sta. Bull. 294: 263-271

Preliminary field tests were made to find a substitute for arsenicals that could be used on peaches. Oil emulsions as ovicides and sodium fluosilicate to poison the larvae showed some promise. Foliage injury was prevented by use of glue and lime.

(142) Gimingham, C. T., and Tattersfield, F.

1928. Laboratory experiments with non-arsenical insecticides for biting insects. Ann. Appl. Biol. 15:649-658.

Sodium, potassium, aluminum, and calcium fluosilicates applied as liquid sprays were toxic and Selenia tetralunaria, Orgyia antiqua, Abraxas grossulariata, and Cheimatobia brumata. Resistance to the poisons varied with the species and age of the insect, younger larvae being most susceptible. Considerable but irregular injury to plant foliage was produced by these compounds.

(143) Hinds, W. E., and Spencer, H.

1928. Insecticidal control for the sugarcane borer. Jour. Econ. Ent. 21:193-197

Sodium fluosilicate gave some control of the sugarcane borer and did not affect parasites unfavorably.

(144) I. G. Farbenindustrie, A.-G.

1928. Mittel zum Beizen von Saatgut. German patent 467,313; issued Oct. 20, appl. May 20, 1927.

Seedlings are cauterized with a mixture of alkali-soluble organic compounds containing mercury with salts of thiocyanic acid or hydroiluric acid. One of these mixtures consists of mercurized cresol and sodium fluoride.

(145) Jacobson, C. A., and Pray, H. A. H.

1928. Fluosilicates of organic bases. Jour. Amer. Chem. Soc. 50:3055-3058.

Fluosilicates of aniline, N-methyl aniline, and o-, m-, and p-toluidine consisting of 2 moles of base with 1 mole of acid have been prepared.

(146) Lyle, C.

1928. Poisons for cutworm baits. Jour. Econ. Ent. 21:748-750

Sodium fluosilicate as a poison for the greasy cutworm (Agrotis ypsilon) and the southern grassworm (Laphygma frugiperda) is less rapid and less toxic in its action than paris green. The compounds were administered in a bait consisting of 50 lb. of wheat bran, 1 lb. of the poison, and enough water to moisten.

(147) Marcovitch, S.

1928. The relative toxicities of arsenicals and fluorine compounds to various organisms. Jour. Econ. Ent. 21:108-114.

At concentrations of 1 to 100, the fluorides of calcium, magnesium, strontium, copper, barium, and lead produced 50 percent mortality of mosquito larvae (Culex quinquefasciatus) in 84, 54, 55, 6, 3, and 1 1/2 hours. Sodium fluosilicate required only 45 minutes, and was better than arsenicals in this respect.

(148) Marcovitch, S.

1928. Lime and sodium fluosilicate. (Sci. Note) Jour. Econ. Ent. 21:436-437.

Sodium fluosilicate reacts with lime in the presence of moisture to give the soluble calcium fluosilicate, which may cause injury to plants. Dry dust that stimulates the cleaning habit appears to be more effective against adult bean beetles or cucumber beetles than dust wetted by dew or moisture.

(149) Marcovitch, S.

1928. Substitute for arsenic. Sci. Monthly 27:459-462.

Attention is called to the possibility of substituting fluorine compounds for arsenical compounds as insecticides.

(150) Marcovitch, S.

1928. Studies on toxicity of sodium fluosilicate. Jour. Pharmacol. and Expt. Ther. 34:179-186.

Cessation of movement in the larvae of Culex quinquefasciatus was taken as the measure of the toxicity, which was in the following order: Sodium fluosilicate, sodium arsenite, sodium arsenate, sodium fluoride. The fluosilicate was eight times as toxic as the fluoride. The fluosilicate was also the most toxic to Lumbricus terrestris, Paramecium caudatum, and Euglena viridis. To rabbits potassium arsenite given by mouth was much more toxic than sodium fluosilicate, the latter more toxic than sodium fluoride. Potassium arsenite intravenously administered to rabbits was slightly more toxic than sodium fluosilicate.

(151) Marcovitch, S.

1928. Studies on toxicity of fluorine compounds. Tenn. Agr. Expt. Sta. Bull. 139, 48 pp.

As a substitute for arsenicals, fluosilicates appear best against phytophagous insects and have given good results against Mexican bean beetle (Epilachna corrupta), cucumber beetle (Diabrotica vittata), potato beetle (Leptinotarsa decemlineata), boll weevil (Anthonomus grandis), blister beetles (Epicauta sp.), sugarcane borer, (Diatraea saccharalis), and cutworms (Feltia ducens), as well as various flea beetles, biting lice, and grasshoppers. Dry dusts of sodium fluosilicate with sulfur are more effective than when moisture is present. Sodium fluosilicate is slightly more toxic to grasshoppers than sodium arsenite. Arsenical and fluorine compounds are both more effective at higher temperatures.

(152) Newton, H. C. F.

1928. Experiments on the control of flea-beetles of the genus Phyllotreta injurious to cultivated crucifer crops. Jour. Southeast. Agr. Col., Wye, Kent 25:116-140.

Of the materials tried, nicotine sulfate as spray or dust was the most effective preventive of flea beetle attack on crucifers. It was also the only spray found to have any insecticidal action. In a single experiment dusting with sodium fluosilicate gave good results.

(153) Porter, B. A., and Sazama, R. F.

1928. A new method of using fish-oil as an adhesive. (Sci.Note) Jour. Econ. Ent. 21:633-634.

Pastes of barium fluosilicate, potassium fluosilicate, and cryolite with fish oil have been prepared, but the resulting mixtures are somewhat flocculent and rather difficult to pump. The addition of casein-lime spreader makes a smoother mix.

(154) Snapp, O. I.

1928. A preliminary report on the toxic value of fluosilicates and arsenicals as tested on the plum curculio. Jour. Econ. Ent. 21:175-177.

Sodium fluosilicate as both dust and spray, without lime, was the most toxic to Conotrachelus nenuphar of all insecticides tested, but also burned foliage severely. The relative toxic value of the other insecticides tested was in the following decreasing order: Barium arsenate, tricalcium arsenate, zinc arsenate, magnesium arsenate, manganese arsenate, aluminum arsenate, sodium fluosilicate with lime, calcium fluosilicate compound, and scorodite.

(155) Thompson, H. W.

1928. Further tests of poison baits in South Wales. Welsh Jour. Agr. 4:342-347.

Sodium fluosilicate is almost as effective as paris green against slugs.

(156) United States Tariff Commission.

1928. Sodium silicofluoride. U. S. Tariff Comm. Rept. to President, 21 pp

Differences in cost of production of sodium fluosilicate in the United States and in Denmark and Holland are shown.

(157) Walker, H. W.

1928. The preparation of a special light sodium fluosilicate and its use as a boll weevil poison. Jour. Econ. Ent. 21:156-164.

Methods have been developed for the preparation of special light forms of sodium and barium fluosilicates for dusting purposes. These materials caused no economic damage to cotton plants and killed weevils more quickly than calcium arsenate. However, they did not adhere well to cotton plants under moist conditions.

(158) Bishopp, F. C.

1929. The pigeon fly -- An important pest of pigeons in the United States. Jour. Econ. Ent. 22:974-980.

Sodium fluoride and sodium fluosilicate are of little value when used, either as a dust or as a dip, for control of the pigeon fly (Pseudolynchia maura Bigot).

(159) Bonde, R., Folsom, D., and Tobey, E. R.

1929. Potato spraying and dusting experiments 1926 to 1928. Maine Agr. Expt. Sta. Bull. 352:97-140.

In 1927 and 1928 bordeaux mixtures were very effective in the control of late blight of potatoes. Less effective was colloidal copper of about one-third the copper content of the bordeaux. Copper-lime dust and sodium fluosilicate also controlled late blight.

(160) Campbell, F. L., and Filmer, R. S.

1929. A quantitative method of estimating the relative toxicity of stomach-poison insecticides. 4th Internatl. Cong. Ent., (Ithaca), 1928, Trans., v. 2, pp. 523-533.

The minimum lethal doses by mouth, in mg. per gram, are given for the rabbit and fourth instar silkworm; rabbits, sodium fluosilicate 0.12; silkworm, 0.09; acid lead arsenate 0.10 and 0.09; basic lead arsenate 0.18 and 0.9; sodium arsenate 0.05 and 0.05. The minimum lethal doses for acid lead arsenate were carefully checked on a large number of larvae and should be useful in predicting the probable amount of lead arsenate necessary to kill other species of insects.

(161) Carter, R. H.

1929. Compatibilities of insecticides I. Fluosilicates and cryolite with arsenates. Jour. Econ. Ent. 22:814-818.

Arsenates were mixed with fluosilicates and cryolite in the ratio of 1 lb. of each to 46 gal. of water, shaken 1/2 hour, and allowed to stand 24 hours at 20° C. Portions were then analyzed for solutions of arsenic and acidity. Lead arsenate may be mixed in water with fluosilicates of sodium, potassium, barium, and calcium without the formation of excessive soluble arsenic. The arsenates of calcium, manganese, magnesium, aluminum, and barium were largely decomposed by fluosilicates, except the "calcium fluosilicate compound." Cryolite seemed to inhibit the formation of soluble arsenic.

(162) Ceylon Department of Agriculture

1929. Preserving wood against dry rot. Trop. Agr. [Ceylon] 72:364-367; Also in Chem. and Drug. 110:137-138.

Methods and preservative agents, including magnesium fluosilicate, are discussed.

(163) Clay, L.

1929. Further tests of cutworm bait poisons. Jour. Econ. Ent. 22:797-798.

Feeding tests on five species of cutworms with a poisoned bait consisting of 1 lb. of paris green (55.12 percent arsenic trioxide) or 1 lb. of 98 percent sodium fluosilicate mixed in 50 lb. of wheat bran and moistened with water showed that this bait killed an average of 99.3 percent of the cutworms in 48 hours, whereas the sodium fluosilicate bait killed an average of 73.2 percent. A bait prepared from dissolved sodium fluosilicate and bran killed only 59.2 percent of the cutworms.

(164) Eddy, C. O., and Clarke, W. H.

1929. The Mexican bean beetle 1927-1928. S. C. Agr. Expt. Sta. Bull. 258, 42 pp.

Calcium fluosilicate as a dust or spray gave promising results for control of the Mexican bean beetle.

(165) Freeborn, S. B., and Wymore, F. H.

1929. Attempts to protect sweet corn from infestations of the corn ear worm, Heliothis obsoleta (Fabr.). Jour. Econ. Ent. 22:666-671.

Sodium fluosilicate extra light, 70 to 75 percent, proved to be the best general insecticide; applied to corn at any stage it increased the immunity to attack by the worms. Some burning of the husks occurred but no material damage. Sodium fluosilicate 95 percent plus equal parts of hydrated lime was also effective, but less so.

(166) Hinds, W. E.

1929. Preliminary studies regarding physical qualities and distribution of sodium silicofluoride dusts. Jour. Econ. Ent. 22:768-773.

Field experiments showed that great variation existed in physical properties and dusting qualities of sodium fluosilicate dusts and powders containing same, which may account for varying results in control of insects.

(167) Hoffman, J. I., and Lundell, G. E. F.

1929. Determination of fluorine and of silica in glasses and enamels containing fluorine. U. S. Dept. Com., Bur. Standards Jour. Research 3:581-595.

A modification of Berzelius method for the determination of fluorine and silicon when occurring together is described. Fluorine is precipitated as lead fluochloride. Precipitationof silicon with ammonium carbonate is aided by adding a nitric acid solution of zinc nitrate to reduce the concentration of sodium carbonate in solution to about 1 percent. Neutralization is then hastened by boiling with a large excess of an ammoniacal solution of zinc oxide.

(168) Huckett, H. C.

1929. A contribution to the study of control measures for cucumber beetles, Diabrotica duodecimpunctata Oliv. and vittata Fabr. Jour. Econ. Ent. 22:405-411.
Sodium fluosilicate and lime dusts are effective when dry.

(169) I. G. Farbenindustrie, A.-G.

1929. Procédé permettant d'améliorer le feutrage des poils animaux. French patent 666,631; issued Oct. 3; appl. Jan. 2, 1929.
The felting of animal hair is improved by treating the hair with solutions of hydrofluric or fluosilicic acid, or their salts.

(170) Kuhn, H. A.

1929. The problem of arsenical residues: Importance of spray deposits from the standpoint of public health. 4th Internatl. Cong. Ent, (Ithaca), 1928, Proc., v. 1, pp. 671-672.
Experiments to determine the minimum lethal dose of a number of insecticides, including arsenious oxide, calcium arsenite, calcium arsenate, lead arsenate, barium fluoride, and sodium fluosilicate, administered by mouth to dogs and rabbits are briefly described. Sodium fluosilicate was not so toxic to warm-blooded animals as calcium arsenate.

(171) Lipp, J. W.

1929. Studies for substitutes for arsenate of lead as a soil insecticide. (Sci. Note) Jour. Econ. Ent. 22:600-601.
Of several fluosilicates and fluorides, as well as other chemicals, applied to the soil against larvae of the Japanese beetle (Popillia japonica Newm.), only sodium and barium fluosilicate killed the larvae. In indoor tests grass grew as well on soil treated with both these materials as on untreated soil but in the outdoor tests the soil treated with sodium fluosilicate hardened, sometimes preventing germination of the grass.

(172) Marcovitch, S.

1929. The control of the tobacco beetle in upholstered furniture. (Sci. Note) Jour. Econ. Ent. 22:602.
Saturated solution of sodium fluosilicate poured into the stuffing of a davenport gave good control of the tobacco beetle (Lasioderma serricorne).

(173) Marcovitch, S.

1929. Sodium fluosilicate as a house fly poison. (Sci. Note) Jour. Econ. Ent. 22:602.
Saturated solution of sodium fluosilicate was allowed to stand where flies had access to it.

(174) Marcovitch, S., and Stanley, W. W.

1929. Cryolite and barium fluosilicate; their use as insecticides. Tenn. Agr. Expt. Sta. Bull. 140, 19 pp.

Barium fluosilicate and synthetic cryolite killed 50 percent of the larvae of the mosquito Culex quinquefasciatus in 55 to 155 minutes, respectively. Both materials gave excellent control of the Mexican bean beetle when applied at the rate of 1 lb. to 50 gals. of water. When applied as a dust at the rate of 6 lbs. to the acre, they controlled the bean beetle on beans and hornworms and flea beetles on tobacco but caused no foliage injury.

(175) Minaeff, M. G., and Wright, J. H.

1929. Mothproofing. Indus. and Engin. Chem. 21:1187-1195.

Process of moth-proofing with formulas based on silicofluorides is described and results are demonstrated. Wool possesses a great affinity for silicoflurides, and therefore these chemicals can be applied in dilute solutions. Moth-proofing with silicofluride formulas is much more effective and lasting than with sodium fluoride. Moth-proofing with alkaloids, nitrogenous compounds, and thiourea derivatives is described.

(176) Robertson, G. M.

1929. Three external parasites of poultry. Tasmanian Jour. Agr. 1:18-20. For lice, treatment with sodium fluoride is recommended.

(177) Saladini, B.

1929. I. fluosilicati nell'industria e nell'agricoltura. Indus. Chim. [Rome] 4:373-375.

The preparation and properties of industrial fluosilicates [sic], such as calcium fluoride and cryolite, are described briefly, as well as the use of zinc and magnesium fluosilicates.

(178) Siegler, E. H., Brown, L., and Yothers, M. A.

1929. A second report on chemically treated bands for the destruction of codling moth larvae. Jour. Econ. Ent. 22:966-972.

Sodium fluoride, sodium fluosilicate, and calcium fluosilicate were somewhat effective but were too slow in their action for satisfactory results.

(179) Anonymous

1930. A possibility of a new insecticide for use on citrus. Farming in So. Africa 5:200,241.

L. B. Ripley and G. A. Hepburn state that sodium fluosilicate has a killing power for the Natal fruit fly 16 times that of lead arsenate. No damage to citrus foliage resulted, but it is known that at higher concentrations it would.

(180) Anonymous.

1930. Fluorine tested for use as insecticide. Calif. Dept. Agr. Monthly Bull. 19:215.

A very brief discussion of fluorine compounds and their use as insecticides.

(181) Alabama Agricultural Experiment Station.

1930. An important cause of frequent failures of alfalfa. Ala. Agr. Expt. Sta. Ann. Rept. 41:37.

Alfalfa from various localities showed that 10 to 80 percent of the stems had been girdled by the three-cornered alfalfa hopper (Stictocephala festina Say). Infestation was reduced to 9 percent in 34 days by an application of sodium fluosilicate dust, that of an adjacent untreated plot being 16 percent.

(182) Barr, H. T.

1930. Laboratory studies on toxic chemical control of wood destroying fungi. Agr. Engin. 11:161-163.

Wood impregnated with sodium fluoride was effectively protected against decay after 2 years as compared with 33 percent damage in untreated wood.

(183) Becker, G. A.

1930. Verfahren, um den Eisenangriff von Holzimprägnierlösungen herabzusetzen. Austrian patent 116,736; issued March 10; appl. Jan. 23, 1929. [Abstract in Chem. Abs. 24:2857. 1930.]

A small quantity of thiourea is added to wood-impregnating solutions containing sodium fluoride but not containing aromatic nitro compounds; thus the corroding action of the solution on iron is diminished. Instead of thiourea there may be used another compound containing the CS group which is not of acid or saline nature.

(184) Biron, M.

1930. Poudrages au fluosilicate de baryum. Rev. Vitic. 72:226-229.

Nicotine powder gave good results against grape worm, but the price was prohibitive. Barium fluosilicate was effective against adult worms. It may be economically mixed with sulfur without disadvantage. When finely powdered it also protects grapes against freezing.

(185) Borchers, W.

1930. [The impregnation of wood for mines.] Chem.-tech. Rundschau 45:445-446, 469-470. [In German. Abstract in Chem. Abs. 24:4372. 1930.]

A discussion of the impregnation of wood, especially that employed in mines, for protection against deterioration, putrefaction, etc., with phenols (cresote, sodium cresote) and with salts (zinc chloride, mercuric chloride, ferrous sulfate, copper sulfate, aluminum sulfate, sodium chloride, sodium fluosilicate, calcium hydroxide, sodium fluoride, potassium fluoride, calcium fluoride). The best combination is that of fluorine salts with nitrated phenols.

(186) Burt, B. C., and Dutt, G. R.

1930. The desert locust in India 1929-1930. Agr. Jour. India 25:417-425

Sodium fluosilicate was used as the insecticide in baits. The action was delayed. It is comparatively harmless to stock.

(187) Campbell, F. L

1930. A comparison of four methods for estimating the relative toxicity of stomach poison insecticides. Jour. Econ. Ent. 23:357-370.

The toxicity of sodium fluosilicate to the fourth-instar silkworm is one to two times that of acid lead arsenate. The fluosilicate affected the silkworm more rapidly than the arsenate. The relative toxic effects of acid lead arsenate and sodium fluosilicate on the silkworm were studied by the sandwich method for establishing the median lethal dose and for determining the relation between dosage and speed of toxic action, and by the simple cage test in which the larvae were allowed to feed freely on poisoned foliage. The same compounds were tested on mosquito larvae by the method of Marcovitch. The first two methods are suitable for measuring the relative toxicity of stomach poison insecticides, the first being the more practicable. The last two methods may be suitable for measuring the relative practical effectiveness of stomach poisons, the cage test being preferred.

(188) Carlos, A. S.

1930. Manufacture and use of insecticides and fungicides. III. Materials used for insecticides and fungicides. Fertilizer, Feeding Stuffs and Farm Supplies Jour. 15:505-506.

Fluorine and sulfur compounds are discussed with particular reference to their physical and chemical characteristics.

(189) Carter, R. H.

1930. Solubilities of the fluosilicates in water. Indus. and Engin. Chem. 22:886-887.

Available data on the solubilities of all the fluosilicates, with a table of references, are given. Solubility curves and data from 0° to 100° C. are given for the fluosilicates of barium, potassium, and sodium.

(190) Carter, R. H.

1930. Fluoaluminates of the alkali metals. Indus. and Engin. Chem. 22:888-889.

Literature of the alkali fluoaluminates is reviewed, and commercial methods of preparation are given. The properties and insecticidal uses of these compounds are discussed.

(191) Cartwright, O. L.

1930. The corn weevil and associated insects. S. C. Agr. Expt. Sta. Ann. Rept. 43:67-70.

In small-scale experiments rice weevil infestations in stored corn were completely controlled by dusts, including sodium fluosilicate dust, at the rate of 1 oz. per bushel.

(192) Casares, J., and Casares, R.

1930. [Rapid method of detecting and determining fluorine in mineral waters.] An. Soc. Espan. Fís. Quím. 28:1159-1160. [In Spanish. Abstract in Chem. Abs. 25:550. 1931.]

In a series of 120-cc. tubes 100 cc. of water and increasing amounts of sodium fluoride are placed. The samples to be tested are in another series. To each is added 1 cc. of concentrated hydrochloric acid and, after shaking, a few drops of a mixture of equal parts of 0.17 percent sodium alizarinsulfonate solution and 0.87 percent zirconium nitrate solution. Comparison of colors shows fluorine content.

(193) Chapman, P. J., and Gould, G. E.

1930. Some notes on dusting cucumbers. Jour. Econ. Ent. 23:197-202.

In preliminary tests in 1929 cucumber plants dusted when moist with dew for control of cucumber beetles and downy mildew were smaller than those treated while dry. The dusts include hydrated lime and gypsum, alone and combined with calcium arsenate, sodium fluosilicate, calcium fluosilicate, and "copper-lime".

(194) D'Costa, J., and Balwant, S.

1930. The toxicity of sodium fluosilicate for domestic animals. Jour. Cent. Bur. Animal Husb. and Dair. India 4:139-145.

No toxic symptoms were observed in buffaloes, bulls, sheep, and goats grazed over a plot of land that had been treated with sodium fluosilicate at the rate of 1 lb. per acre for the destruction of locusts. Bulls fed 5 to 25 grains of this material mixed with bran mash and molasses did not develop toxic symptoms. A bull drenched with 0.5 drachm of sodium fluosilicate showed depression and slight alimentary disturbance, whereas another bull drenched with 0.5 oz. developed severe poisoning. When killed 3 months later both animals showed evidence of the toxicity of the salt in the abomasum and the duodenum.

(195) Douglas, W. A.

1930. A velvet bean caterpillar as a pest of soy beans in southern Louisiana and Texas. Jour. Econ. Ent. 23:684-690.

A commercial "light" sodium fluosilicate (80 to 84 percent pure), dusted at the rate of 10 to 12 lb. per acre, was effective against caterpillars of Anticarsia gemmatilis on soybeans and caused no appreciable burning if the plants were dry.

(196) Fairchild, J. G.

1930. The volumetric determination of fluorine by the use of ferric chloride. Jour. Wash. Acad. Sci. 20:141-146.

A detailed study of the conditions that must be observed in the volumetric determination of fluorine with use of ferric chloride. Under proper conditions quantities of fluorine from 0.005 to 0.060 g. can be determined.

(197) Florida Agricultural Experiment Station.

1930. Life history studies and control of the velvet bean caterpillar. Fla. Agr. Expt. Sta. Rept. 1928-29:53.

Calcium fluosilicate was used with satisfactory results against the velvetbean caterpillar on peanuts.

(198) Grubenholzimprägnierung, g. m. b. H.

1930. Improvements in or relating to the preserving of wood. British patent 314,380; issued May 22; appl. June 18, 1929.

In effecting successive impregnations, as with solutions of salts of zinc, mercury, or copper, and then with alkali fluorides, arsenates, or arsenites, the first liquid is introduced by the empty-cell process and the second liquid by the full-cell process.

(199) Grubenholzimprägnierung G. m. b. H.

1930. An improved preservative for wood. British patent 352,272; issued July 9; appl. July 21, 1930.

A preservative is used consisting of soluble fluorine compounds such as soluble salts of hydrofluoric acid or hydrofluosilicic acid and soluble chromium compounds such as chromium oxide, an alkali-metal dichromate, or a chromate of sodium, potassium, or calcium.

(200) Grubenholzimprägnierung G. m. b. H.

1930. Improvements in or relating to preservatives for wood. British patent 315,860; issued July 10; appl. June 21, 1929.

Different soluble compounds of arsenic or fluorine are used or formed in the wood by successive treatments of the wood with zinc sulfate solution and with a hot aqueous solution containing sodium arsenite and sodium fluoride.

(201) Hinds, W. E.

1930. The occurrence of Anticarsia gemmatilis as a soybean pest in Louisiana in 1929. Jour. Econ. Ent. 23:711-714.

Sodium fluosilicate is recommended against this pest.

(202) I. G. Farbenindustrie, A.-G.

1930. Process for the manufacture of diazonium salts of complex metallic fluoric acids. British patent 332,227; issued July 16; appl. April 16, 1929.

Diazonium compounds of complex metallic fluoric acids are made by causing complex acids, such as titanium, aluminum, and tin hexafluoric acids and antimony tetrafluoric acid, or their salts, to react with diazonium compounds such as tetrazotized dianisidine or diazotized 4-aminoazobenzene or 3-nitroaniline. The products may be used in dyeing and printing and in combating insect pests.

(203) India, United Provinces of Agra and Oudh.

1930. Locust control. 86 pp. Allahabad. [Abstract in Rev. Appl. Ent. (A)19:60-61. 1931.]

Grasshoppers may be controlled by sodium fluosilicate in bait in stony or forest areas or as a dust in jungle grass or heavy undergrowth. The preparation of this bait is discussed.

(204) Jancke, O.

1930. Weiterer Beitrag zur Bekämpfung der Kirschblattenmotte (Argyresthia ephippiella). Gartenbauwissenschaft 3:384-390.

Adult moths were poisoned in laboratory tests by 2-percent sugar solutions containing 0.4 and 0.6 percent of sodium fluoride or sodium fluosilicate.

(205) Laing, F.

1930. The cockroach. Its life history and how to deal with it. Brit. Mus. (Nat. Hist.) Econ. Ser. 12, Ed. 2, 23 pp.

An account of the life history and depredations of roaches and recommendations for their control with a mixture of 3 parts sodium fluoride and 1 part pyrethrum.

(206) Lange, W., and Müller, E.

1930. Über die Salze der Phosphor-hexafluorwasserstoffsäure, HPF_6. Ber. Deut. Chem. Gesell. 63(B):1058-1070.

The preparation and properties of several organic salts of hexafluophosphoric acid are described.

(207) Light, S. F., Randall, M., and White, F. G.

1930. Termites and termite damage with preliminary recommendations for prevention and control. Calif. Agr. Expt. Sta. Circ. 318, 64 pp.

The method of blowing poisonous dusts into the termite tunnels with a dust gun is described. Sodium fluosilicate may be used with success.

(208) Lysaght, A. M.

1930. Bronze beetle research. Report for the two years ending November 1929. New Zeal. Dept. Sci. Indus. Research, Bull. 25. 32 pp.

Against the bronze beetle (Eucolaspis brunnea F.) in laboratory experiments on various kinds of foliage, sodium fluosilicate dust acted as a repellent, but the beetles were poisoned by collecting it on their tarsi and antennae. No scorching of dry leaves occurred, but under moist conditions a carrier would be necessary. A 0.5-percent solution used as a spray was as toxic as the dusts, but caused slight scorching of the foliage.

(209) McAllister, L. C., and Van Leeuwen, E. R.

1930. Laboratory tests of miscellaneous chemicals against the codling moth. Jour. Econ. Ent. 23:907-922.

A total of 283 materials were tested as possible substitutes for lead arsenate in the control of codling moth. These materials consisted of fluorides, fluosilicates, organic compounds, and arsenicals. Comparative results are given.

(210) Manonov, B. A.

1930. Pests of the castor oil plant in North Caucasus. [In Russian.] Jour. Agr. Research N. Caucasus, No. 3(20), pp. 119-140; also as Bull. Sev. Kavkaz. Kraev. S.-Kh. Opuit. Sta. [Bull. N. Caucas. Agr. Expt. Sta.], No. 311, 22 pp. [Abstract in Rev. Appl. Ent. 19(A):108. 1931.]

Undiluted dusts of barium fluoride and a spray of 2 percent sodium fluoride were tentatively recommended. A list of the important species in North Caucasus is given.

(211) Manonov, B. A.

1930. Observations on Loxostege sticticalis and the results of tests of the action of insecticides on cultivated oil plants. [In Russian.] Jour. Agr. Research N. Caucasus, No. 3(20), pp. 165-230; also as Bull. Sev. Kavkaz. Kraev. S.-Kh. Opuit, Sta. [Bull. N. Caucas. Agr. Expt. Sta.], no. 314, 66 pp. [Abstract in Rev. Appl. Ent. 19(A):109. 1931.]

Sodium fluoride as a spray and a dust of equal parts of barium fluoride and lime were highly toxic to the insect and caused little if any damage to the plants.

(212) Marcovitch, S., and Stanley, W. W.

1930. Insecticidal properties of cryolite and barium fluosilicate. Indus. and Engin. Chem. 22:121.

Both materials gave excellent control of the Mexican bean beetle when used as a spray at the rate of 1 lb, to 50 gal. These compounds were also effective, and safe on bean foliage, when used as a dust at the rate of 6 lb. per acre. At the rate of 30 lb. per acre burning may be encountered under certain atmospheric conditions. Five weekly dustings on tobacco (6 lb. per acre) produced no foliage injury with either material and controlled the hornworm and flea beetles. Fish oil in the proportion of 25 percent of the weight of the insecticide was added to increase adhesiveness. Cryolite and barium fluosilicate are both highly toxic to insects. Barium fluosilicate is more toxic to adult insects than cryolite.

(213) Marcovitch, S., and Stanley, W. W.

1930. Two arsenical substitutes. Jour. Econ. Ent. 23:370-376.

Cryolite and barium fluosilicate offered the most promise as substitutes for arsenic. One pound of either compound to 50 gal. of water gave excellent control of the Mexican bean beetle. They may also be used as dusts on tobacco for tobacco hornworm (Protoparce sexta) and tobacco flea beetles (Epitrix cucumeris) and on beans for the bean beetle.

(214) Michigan Agricultural Experiment Station.

1930. The effect of fluorine feeding on the health and osteid tissue of dairy cattle. Mich. Agr. Expt. Sta. Bien. Rept. 1929-30:22.

Feeding fluorine for short periods in quantities equal to 0.03 percent or more of the dry matter in the ration of 10 mature cows was sufficient to throw the animals off feed. When fed over a period of a year in quantities equal to those they would have received from a 3-percent raw rock phosphate supplement, the teeth and long bones showed abnormal development.

(215) New York (Geneva) Agricultural Experiment Station.

1930. The European corn borer with respect to sweet corn in New York. N. Y. (Geneva) Agr. Expt. Sta. Ann. Rept. 49:68-69.

In experiments with insecticides as sprays against the European corn borer calcium fluosilicate considerably reduced the number of larvae. None of the dusts tried were effective.

(216) Nowotny, R.

1930. [Impregnation experiments on heartwood.] Korrosion und Metallschultz 6:82-84. [In German. Abstract in Chem. Abs. 24:4372, 1930.]

Experiments were made on the effects of preliminary incising on increasing the depth of penetration of sodium fluoride solutions into the heartwoods of pine, fir, and larch. Without puncturing no penetration can be obtained in the heartwoods of these species. Preliminary incision permits a penetration slightly in excess of the depth of the penetrating needle. The diffusion of the preservative solution is greatest in the direction of the wood fibers, or longitudinally, next latterly along the annual rings, and least radially.

(217) Oregon Agricultural Experiment Station.

1930. Strawberry root-weevil. Oreg. Agr. Expt. Sta. Bien. Rept. 1928-30:87.

Ninety percent control of the strawberry root weevil (Dyslobus decorata Lec.) was obtained in 1930 with a bait of bran and sodium fluosilicate.

(218) Oregon Agricultural Experiment Station

1930. Codling moth studies. Oreg. Agr. Expt. Sta. Bien. Rept. 1928-30:88.

Results against the codling moth (Cydia pomonella L.) with sodium and barium fluosilicates warrant further tests.

(219) Pertusi, C.

1930. Una nuova reazione dei fluoruri. Congr. Naz. Chim. Pura ed Applicata Atti., 3rd Cong., Rome and Abruzzo, 1930:573-575.

Reagent consists of a solution of benzidine acetate prepared from 1.84 g of benzidine, a little concentrated acetic acid, and distilled water to make up to 500 cc, mixed with equal parts of 0.05 N mercury succinimide solution. A yellow precipitate is formed with as little as a drop of 0.05 N fluoride or 0.00004 g of hydrofluoric acid.

(220) Pettey, F. W., and Mossop, M. C.

1930. A report of further experiments of new methods for the control of codling moth in western districts of the cape province. Union So. Africa Dept. Agr. Sci. Bull. 96:50 pp.

An artificial cryolite used at the rate of 2 lb. with 0.25 pint of fish oil in 40 gal. of water applied at intervals of 3 weeks throughout the season gave better results in codling moth control than a similar program of normal-strength lead arsenate and seemed to have considerable effect in controlling mealybugs on kiefer pears. Some samples of cryolite caused severe foilage burning, but others did not.

(221) Poeteren, N. van

1930. Verslag over de Werkzaamheden van den plantenziektenkundigen Dienst in het jaar 1929. Verslag. en Meded. Plantenziektenkund. Dienst, Wageningen no. 62, 142 pp. [Abstract in Rev. Appl. Ent. 19(A):242. 1931.]

In experiments in combating the beet fly (Pegomyia hyoscyami Panz.) the best results were obtained with a spray of sodium fluosilicate and sugar.

(222) Ripley, L. B., and Hepburn, G. A.

1930. A new insecticide against maize stalk-borer. Farming in So. Africa 5:285-287.

Derrisol has a higher toxicity than cryolite but volatilizes appreciably in hot weather. Preliminary experiments indicate that best results can be obtained with a suspension of cryolite in Derrisol. Natural cryolite is slightly more toxic to the borer than the synthetic material. Both materials cause plant burning to about the same extent. Because of its finer state of subdivision, synthetic cryolite adheres better to foliage.

(223) Rooke, H. G. D.

1930. Note on locusts in Iraq and the control measures adopted. Mesopotamia Dept. Agr. Mem. 13, 13 pp.

Outbreaks of the Moroccan locust (Dociostauras marocanus) led to experimental work with poison baits containing sodium fluoride, sodium arsenite, or paris green. Baits containing sodium arsenite are recommended.

(224) Roubaud, E.

1930. Biological researches on Pyrausta nubilalis. III. Internatl. Corn Borer Inves. Sci. Repts. 3:1-27.

Natural cryolite dusted on corn plants at the rate of 50-60 grams per square meter gave very good control of the European corn borer.

(225) Sanders, P. D., and Langford, G. S.

1930. Observations on the Mexican bean beetle and the potato tuber moth. Peninsula Hort. Soc. [Del.] Trans. 20:168-171.

Against the bean beetle on beans barium fluosilicate 1 lb. to 50 gal. gave good control and did not injure plants; as a dust it caused discoloration of the foliage. Potassium fluoaluminate showed promise against the bean beetle when mixed well with bordeaux, and did not injure the foliage.

(226) Smith, L. M.

1930. The snowy tree cricket and other insects injurious to raspberries. Calif. Agr. Expt. Sta. Bull. 505, 38 pp.

The snowy tree cricket (Oecanthus niveus Deg.) is best controlled by a dust of 70 percent sodium fluosilicate and 30 percent diatomaceous earth applied at the rate of 50 lb. per acre. No berries should be picked for 10 days after dusting. A mixture of bran, molasses, water, amyl acetate, and sodium fluosilicate proved to be a satisfactory bait. Against strawberry root worm (Paria canellus var. quadrinotata Say) a dust of 70 percent sodium fluosilicate and 30 percent diatomaceous earth at the rate of 100 lb. to the acre in the fall is recommended.

(227) Steinkopf, W.

1930. Über aromatische Sulfofluoride. II. Jour. Prakt. Chem. (n.s.) 128:63-88.

Aromatic sulfonyl fluorides are stable towards metals such as copper and potassium. Several reactions are given.

(228) Ugryumov, G. D., and Traut, I. I.

1930. A preliminary summary of investigations for the year 1929 on the effectiveness of various chemical methods in combating insect pests and diseases which attack plants. Udobrenie i Urozhai [Fertilizers and Crops] 2:45-53. [Abstract in Chem. Abs. 25:1322-23. 1931.]

The authors discuss the results of experiments on the methods of treating grain against wet smut, extermination of rodents, and measures against insect pests. Fluorine preparations are used in baits against rodents, but are not so good as strychnine. The sodium compounds of fluorine proved better than arsenicals in control of insect pests.

(229) Wallengren, H.

1930. On the infection of Pyrausta nubilalis Hb. by Metarrhizium anisopliae (Metsch) Scr.-II. Internatl. Corn Borer. Invest. Sci. Rept. 3:64-73. [Abstract in Rev. Appl. Ent. (A)19:148-149. 1931.]

A mortality of about 99 percent of the corn borers was obtained by dusting the plants with sodium fluosilicate.

(230) Alabama Agricultural Experiment Station.

1931. Turnip webworm control. Ala. Agr. Expt. Sta. Ann. Rept. 42:47-48.

In dust form barium fluosilicate, sodium fluosilicate, and cryolite killed all the larvae of the turnip webworm. Cryolite and sodium fluosilicate sprays were valueless.

(231) Alabama Agricultural Experiment Station.

1931. Life history and control of the cowpea curculio. Ala. Agr. Expt. Sta. Ann. Rept. 42:48-49.

In cage tests dusts of sodium fluosilicate and barium fluosilicate on cowpea foliage caused a high mortality to cowpea curculio (Chalcodermus aeneus Boh.). Cryolite appeared ineffective.

(232) Andrewartha, H. G.

1931. The apple curculio. Jour. Dept. Agr. West Aust. 8:106-114.

Baits consisting of 9 lb. of dried apple to 1 lb. of sodium fluoride were effective in preliminary experiments against the apple curculio (Otiorrhynchus cribricollis).

(233) Batchelder, G., and Meloche, V. W.

1931. The volumetric estimation of fluorine by means of cerous nitrate. Jour. Amer. Chem. Soc. 53:2131-2136.

Fluorine in neutral solutions can be determined by adding a measured volume of cerous nitrate solution and titrating the excess with potassium permanganate, but it is preferable to titrate directly with cerous nitrate, with methyl red as indicator.

(234) Batiashvili, I. D.

1931. Comparative tests of insecticides on the caterpillar of Hyponomeuta malinellus Zell. Bull. Sci. Research Inst. U. S. S. R., Tree and Small Fruit Culture, Sect. Plant Protection. (Ent.) 3 39 pp. [In Russian. Abstract in Rev. Appl. Ent. 19(A):504. 1931.]

Laboratory and field experiments against fourth-instar larvae of Hyponomeuta malinellus Zell. on apples are reported. Spraying with "1 per mille" sodium fluosilicate with addition of flour as a spreader killed 49 percent of the larvae and scorched only 2 percent of the foliage. Addition of lime to the spray increased the injury to the leaves.

(235) Bishopp F. C., and Wagner, R. D.

1931. Nicotine in the control of ecto-parasites of poultry. Jour. Econ. Ent. 24:56-61.

Nicotine proved more efficient than sodium fluoride in control of lice on chickens.

(236) Bondy, F. F.

1931. Boll weevil studies. S. C. Agr. Expt. Sta. Ann. Rept. 44: 99-101.

Sodium fluosilicate with calcium oxide proved of no value for boll weevil control. Calcium arsenate dust in three to five applications gave satisfactory control throughout the season.

(237) Boyce, A. M.

1931. Effectiveness of certain materials in producing mortality of the walnut husk fly (Rhagoletis completa Cress.). Calif. State Dept. Agr. Monthly Bull. 20:682-690.

On the basis of the time required for 50-percent mortality, fluorine and arsenic compounds were relatively speedy and effective. Barium and sodium fluoride, barium, sodium, and magnesium fluosilicates, and cryolite were effective, but calcium fluoride and calcium fluosilicate compound proved unsatisfactory. Of the fluorines [sic] tested the calcium and barium combinations and cryolite can be safely used on foliage.

(238) Browne, A. C.

1931. Oecanthus niveus (DeGeer) in some California fruits. Calif. Dept. Agr. Monthly Bull. 20:633-643.

Apple trees dusted with sodium fluosilicate at the rate of 25 pounds per acre showed no injury by snowy tree crickets at harvest whereas much of the fruit was damaged on adjacent undusted trees.

(239) Burgess, R., and Poole, E. J.

1931. Observations on the susceptibility of animal fibres to damage by the larvae of two species of clothes moth, Tinecla biselliella Hummel and Tinea pellionella L. Jour. Textile Inst. 22:T141-157.

Worsted cloth impregnated with Larvex or Eulans is satisfactorily proofed against damage by these clothes moths.

(240) California Agricultural Experiment Station.

1931. [The corn earworm.] Calif. Agr. Expt. Sta. Rept. 1929-1930: 67.

Further experiments against the corn earworm (Heliothis obsoleta F.) showed that 70 percent sodium fluosilicate gave the best results among a number of dusts tested.

(241) Carter, R. H.

1931. The incompatibility of lime with fluosilicates. Jour. Econ. Ent. 24:263-268.

The chemical property of fluosilicates in relation to insecticidal use and injury to foliage is described. The addition of small quantities of calcium hydroxide to sodium, potassium, and barium fluosilicates materially decreased their solubility, probably because of the introduction of a common ion from the reactions. Strong alkaline solutions were formed when an excess of lime was present.

(242) Carter, R. H.

1931. Determination of barium fluosilicate spray residue. Indus. and Engin. Chem., Analyt. Ed. 3:146-147.

Apples are washed by immersion for 30 seconds in a boiling 3 percent sodium hydroxide solution and rinsed with slightly acidulated water. The rinsings and washing solutions are cooled, made strongly acid with hydrochloric acid, and filtered rapidly. The filtrate is then made strongly alkaline with sodium hydroxide, and the barium is percipitated as barium sulfate with an excess of sulfuric acid. The barium sulfate is then calculated to barium fluosilicate. This method is fairly rapid and gives reproducible results which are sufficiently accurate for comparative work.

(243) Chemische Fabrik Ludwig Meyer.

1931. Saatgutbeize. German patent 520,892 Appl. May 17, 1930.

A disinfecting and stimulating preparation contains essentially basic mercuric fluoride. In the example the preparation contains basic mercuric fluoride, mercuric chloride, mercuric iodide, and potassium acid fluoride.

(244) Churchill, H. V.

1931. Occurrence of fluorides in some waters of the United States. Indus. and Engin. Chem. 23:996-998.

Potable waters from many cities have been examined for fluorides, chiefly by the spectroscopic method. Many of these waters contain fluorides in surprisingly high quantities. No casual connection has been established between the occurrence of fluorides in these waters and the mottled enamel effect. The physiological effect of fluorides is obscure.

(245) Delage, B.

1931. Travaux recents sur les insecticides et anticryptogamiques. Revue de phytopharmacie. Ann. Agron. (n.s.) 1:366-385. [Abstract in Rev. Appl. Ent. (A)21:173, 1933.]

A survey of recent work on insecticides and fungicides, including pyrethrum, fluorides, fluosilicates, organic mercury compounds, arsenicals, and petroleum oils.

(246) Delassus, M.

1931. Algeria: information on the last anti-locust campaign. Internatl. Rev. Agr. Econ. [Rome] 22:89M-94M.

A 4-percent solution of sodium fluosilicate was found to be effective as a contact insecticide or as a stomach poison.

(247) Downes, W.

1931. The strawberry root weevil, with notes on other insects affecting strawberries. Canada Dept. Agr. Pamphlet (n.s.) 5 Rev., 16 pp.

Baits containing sodium fluoride or sodium fluosilicate are recommended against Otiorrhynchus ovatus L. Good results were obtained in poisoning Polyphylla decemlineata Say with sodium fluosilicate-bran bait.

(248) Dyson, G. M.

1931. The industrial compounds of fluorine. Chem. Age. 25: 472-473.

Sodium fluoride is recommended for wood preservation, as a water softener, and as an insecticide; sodium acid fluoride as a frosting agent for glass, also for removal of "iron mould"; potassium acid fluoride as a frosting agent; ammonium acid fluoride as a frosting agent, also in the fermentation industries to inhibit contaminating organisms without affecting yeast; sodium antimony fluoride (Fluoremetic) as a mordant in dyeing; cerous fluoride in pencils for arc lamps to give fog-penetration powers; chromium fluoride as a mordant in logwood dyeing; cupric fluoride as an oxidant in aniline-black printing; sodium

(248) Dyson, G. M. Continued.

fluosilicate in the preparation of fire enamels, preservative for rubber latex, and insecticidal use; aluminum fluoride as a substitute for lead arsenate; zinc fluosilicate for the preservation of stonework and as a general preservative. The last-named pompound has high value as an antiseptic but is unsuited to medicinal work. No organic fluorine derivatives are in use medicinally, although some have been suggested for use.

(249) Ewing, K. P.

1931. Cage tests of the effectiveness of insecticidal dusts for the control of the cotton flea hopper. Jour. Econ. Ent. 24:821-827.

The most toxic materials to the adults named in descending order were nicotine-calcium arsenate mixture, nicotine-lime mixture, sodium fluosilicate, paris green-calcium arsenate mixture. Superfine sulfur was highly toxic to the nymphs.

(250) Fairbrother, T. H.

1931. Moth-proofing compounds. Soap 7(9):97, 99, 101, 103, 111.

A review of the problems of moth-proofing agents and methods of testing such compounds is given. The development, methods of application, and limitations of turpentine, p-dichlorobenzene, inorganic and organic fluorides, Eulan, dichloroethane, alpha-ketotetrahydronaphthalene, extracts of lupine seeds, quillaja bark, and a number of other compounds as moth-proofing agents are discussed.

(251) Friend, R. B., and Turner, N.

1931. The Mexican bean beetle in Connecticut. Conn. Agr. Expt. Sta. Bull. 332:71-108.

Against the Mexican bean beetle (Epilachna corrupta Mulsant) a dust of 1 part barium fluosilicate plus 5 parts lime is recommended.

(252) Grubenholzimprägnierung, G. m. b. H.

1931. Agents de conservation du bois. French patent 698,624, issued Feb. 2; appl. July 7, 1930.

Wood is preserved with a mixture of equal parts of potassium dichromate and sodium fluoride.

(253) Guillissen, J., and Union Chimique Belge, Société Anonyme.

1931. Improvements in the relating to fungicides. British patent 357,443; issued Sept. 24; appl. Dec. 18, 1930.

A material for treating seeds in the dry state is formed preferably of basic copper carbonate and sodium fluosilicate.

(254) Halpin, J. G., and Hayes, J. B.

1931. Fight poultry lice and mites. Wis. Agr. Coll. Ext. Cir. 56, (6th ed.) 8 pp.

A popular account of lice and mites on poultry, with recommendation for a dip, dust, or grease containing sodium fluoride.

(255) Hamilton, C. C.

1931. Tests on the control of several insects attacking ornamental plants. Jour. Econ. Ent. 24:162-169.

Adults of Brachyrhinus sulcatus Fabr., grubs of which were feeding on the roots of taxus plants, were successfully controlled by baits consisting of apple scraps impregnated with 3.5 percent sodium fluosilicate.

(256) Hatfield, I.

1931. Recent experiments with chemicals suggested for wood preservation. Amer. Wood Preservers' Assoc. Proc. 1931:304-314. [Abstract in Chem. Abs. 26:5723-5724. 1932.]

The relative toxicities of 25 chemicals to three wood-destroying and four sap-staining fungi were determined with nutrient agar in Petri dishes incubated at 25° C. for 21 days. Four groups of chemicals were tested: (1) Mercury ethyl and phenyl compounds; (2) German proprietary preservatives, including combinations of sodium fluoride and dinitrophenols and cresols; (3) orthodichlorobenzene and three phenol dirivatives; (4) miscellaneous, including formaldehyde and ammonium arsenious trioxide. In group (1) the ethyl-mercury compounds were most effective against both wood destroyers and blue stainers; in group 2 sodium dinitrophenolate; in group 3 tetrachlorophenol; and in group 4 Minerec and butyl phenolate were best. Higher concentrations were required to kill blue-stain fungi than wood-destroying fungi. Tests considered toxicity only, with no regard to effect on wood, metals, solubility, volatility, leachability, and permanence.

(257) Hinds, W. E., and Osterberger, B. A.

1931. The soybean caterpillar in Louisiana. Jour. Econ. Ent. 24:1168-1173.

Insecticidal control of the soybean caterpillar (Anticarsia gemmatilis Hbn.) has been found practicable by dusting with sodium or barium fluosilicate at the rate of 15-16 lb. per acre.

(258) Hodson, W. E. H.

1931. A new method of preventing attacks of bulb flies on narcissus. Jour. Min. Agr. [Gt. Brit.]. 38:54-60.

Against narcissus bulb flies (Merodon equestris and Eumerus tuberculatus) poison baits containing a small amount of sodium fluoride were effective. Very promising results were obtained in field tests.

(259) Huckett, H. C.

1931. The tolerance of beans to sprays and dusts for the Mexican bean beetle. Jour. Econ. Ent. 24:200-204.

Studies with commercial brands of arsenicals, barium fluosilicate, and cryolite in spray and dust mixture against Epilachna corrupta indicate that certain arsenicals cannot always be used with safety upon bean plants. Potassium arsenate, barium fluosilicate, and cryolite are the safest to use on the foliage at the commonly recommended concentrations.

(260) Iigura, S.

1931. [Dusting insecticide.] Japanese patent 92,999, issued Sept. 28, [In Japanese, Abstract in Chem. Abs. 26:4128. 1932.]

Metallic arsenate or fluosilicate is prepared in a solution to which are added acid clay, kieselguhr, talc, gelatin, glue, casein, resin, and basic compounds of bivalent and tervalent metals. The product fixes well to plants, and the added materials decrease the solubility of the arsenate or fluosilicate.

(261) Jancke, O.

1931. Beiträge zur innertherapeutischen Schädlingsbekämpfung. Ztschr. Angew. Ent. 18:276-318.

Nutrient solutions containing nicotine, mercuric chloride, chlorothymol, sodium fluoride, and barium chloride absorbed by plants in tolerated amounts were also tolerated by aphids. The possibility of controlling insects by intratherapeutic treatments did not appear promising.

(262) Joubert, C. J.

1931. Codling moth control. Farming in So. Africa 6:229, 231-232.

In six out of seven comparative experiments cryolite sprays (2 lb. in 40 gal. of water with 1/4 pt. fish oil) gave 3 to 25 percent better control of the codling moth on pears than did lead arsenate sprays.

(263) Kramer, H.

1931. [Anti-moth materials.] Soc. Indus. Rouen Bull. 59:48-53. [In French, Abstract in Chem. Abs. 25:4712, 1931.]

Certain acids, e. g., stibiotungstic, phosphotungstic, and titanohydrofluric, have a protective action if well distributed over the fabric but are not fast to rinsing.

(264) Lacroix, D. S.

1931. Tobacco insect studies in 1930. Conn. Agr. Expt. Sta. Bull. 326:419-431.

Against the potato flea beetle (Epitrix cucumeris Harr.) on tobacco good results were obtained with dusts of cryolite and barium fluosilicate, neither of which caused foliage injury. Dusts were used at rate of 30 lb. per acre.

(265) Langenbuch, R., and Schewket, N.

1931. Zur Lebensgeschichte des Moosknopfkäfers (Atomaria linearis Steph.). Nachrblatt. Deut. Pflanzenschutzdienst 11:17-19.

Atomaria linearis Steph. on sugar beets was not susceptible to treatments with sodium fluoride.

(266) Marcovitch, S., and Anthony, M. V.

1931. A preliminary report on the effectiveness of sodium fluosilicate as compared with borax in controlling the house fly (Musca domestica Linne). Jour. Econ. Ent. 24:490-497.

Sodium fluosilicate is recommended instead of borax for spraying manure piles to destroy the larvae of the house fly.

(267) Marcovitch, S. and Stanley, W. W.

1931. A preliminary report on arsenical substitutes for peach spraying. Tenn. Hort. Soc. Proc. 27:86-92.

Seven sprays of a commercial brand of barium fluosilicate and sulfur reduced infestation of the oriental fruit moth larvae (Laspeyresia molesta Busk).

(268) Marcovitch, S., Stanley, W. W., and Anthony, M. V.

1931. A preliminary report on arsenical substitutes for peach spraying. Jour. Econ. Ent. 24:844-850.

The fluorine compounds were safe on foliage at concentrations of 1 lb. to 50 gal. of water. The largest percentage of sound fruit was recorded for the plot receiving a dust of 50 percent barium fluosilicate and 50 percent sulfur. The plots sprayed with cryolite and barium fluosilicate showed 77.6 percent sound fruit as compared with 68 percent for lead arsenate and 5.8 percent in the check plots. The fluorine sprays and dusts were decidedly more efficient than lead arsenate against the oriental moth.

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(269) Miller, R. L., and McBride, O. C.

1931. Experiments with copper carbonate, lead arsenate, and other compounds against the Mediterranean fruit fly in Florida. Jour. Econ. Ent. 24:1119-1131.

Cupric fluoride and potassium aluminum fluoride were tested against the Mediterranean fruit fly, but they did not show up so well as some of the other materials tested.

(270) Moreland, R. W., and Bibby, F. F.

1931. Field tests in Texas of insecticides for control of the cotton bollworm (Heliothis obsoleta Fab.) Jour. Econ. Ent. 24:1173-1181.

The application of sodium fluosilicate dust to cotton gave but slight, if any, control of the bollworm in 1928. In 1929 the plat treated with this material yielded more cotton than the untreated plat but not so much as the plat treated with calcium arsenate.

(271) Müller, K. R.

1931. Die Bekämpfung der Rübenfliege mit Fluornatrium. Landw. Wchnschr. Sachsen 89:448-449.

Spraying with a solution containing 3 to 4 g. sodium fluoride and 20 g. of sugar per liter is recommended.

(272) Nawa, S.

1931. [Insecticide.] Japanese patent 93,072; issued Oct. 5. [In Japanese, Abstract in Chem. Abs. 26:4408. 1932.]

A powdered mixture of potassium fluosilicate, calcium sulfate, and wheat or the like is specified.

(273) New Jersey Agricultural Experiment Station

1931. Controlling cockroaches in the greenhouse. N. J. Agr. Expt. Sta. Ann. Rept. 1930-31:226-227.

The cockroach Periplaneta americana L. in greenhouses was killed by a poison bait of bread crumbs and 3 to 4 percent sodium fluosilicate, with sufficient water to form a mash.

(274) Newcomer, E. J.

1931. A substitute for lead arsenate. Better Fruit 25(9):7-8.

Attention is called to the value of fluorine compounds in combating the codling moth, several having been proved equal to lead arsenate. Barium fluosilicate and cryolite are available in suitable form. No injury that could be attributed to them was observed, and they did not affect the color, size, or quality of the fruit.

(275) Newcomer, E. J.

1931. A codling moth control schedule for 1932. Wash. State Hort. Assoc. Proc. 27:46-50.

After July, oil emulsions should be combined with other insecticides than lead arsenate, such as cryolite or barium fluosilicate, at the rate of 3 lb. to 100 gal. In some cases in 1931 cryolite proved more effective than lead arsenate.

(276) Newcomer, E. J., and Carter, R. H.

1931. Fluorine compounds as substitutes for lead arsenate in the control of the codling moth. Idaho State Hort. Assoc. [Proc.] 36:161-165.

Barium fluosilicate, potassium fluosilicate, and cryolite gave results comparable with those obtained with lead arsenate for control of the codling moth on apples in Pacific Northwest. A spray containing 4 lb. of the fluorine compound and 1 pint of fish-oil or mineral-oil emulsion per 100 gal. of water is recommended.

(277) Newman, L. J.

1931. The principal insect pests of tobacco. Jour. Dept. Agr. West. Aust. 8:520-541.

The larvae of the cut worm Agrotis munda may be held in check by a poison bait of 1 lb. sodium fluoride to 30 lb. bran, scattered between the rows.

(278) Osima, S.

1931. Paint for ship's bottom. Japanese patent 90,889; issued April 2. [Abstract in Chem. Abs. 25:5048. 1931.]

The paint consists of mercury, copper, fluosilicates, etc. A mixture of mercuric oxide 5, cupric oxide 25, sodium fluosilicate 30, ferric oxide 40 percent, and copal varnish 120 is an example.

(279) Pannewitz, E.

1931. Die wirksamen Stoffe der Holzkenservierungsmittel. Ztschr. Desinfektion- u. Gesundheitsw. 23:57-68.

The inorganic and organic chemicals in use or proposed for fungicides or insecticides in wood conservation are completely reviewed. A number of fluorine compounds are mentioned.

(280) Pettey, F. W.

1931. The codling moth and experiments for its control in apple orchards of the high veld during 1930-1931. Union So. Africa Dept. Agr. Sci. Bull. 104. 30 pp.

Artificial cryolite was not so effective as lead arsenate in controlling codling moth in high veld orchards, but it caused no foliage injury whereas the arsenate sprays did considerable damage. The results indicate that cryolite is more effective in control in arid summer coastal regions than in those where summer rainfall occurs.

(281) Polivka, J. B.

1931. The effect of physiological change in the corn plant on corn borer survival. Jour. Econ. Ent. 24:394-395.

Physiological differences in the corn plant produce significant difference in the responses of the borer. For example, for each day's delay in silking there is a coincident reduction of about 4 percent in the borer population. These differences are particularly important when the effects of insecticides are under consideration. Heavy application of sodium fluosilicate reduced the borer population and also the yield, which was accompanied by delay in date of silking. The survival of the corn borer is apparently affected if the development of the corn is retarded by mechanical or insecticidal treatments.

(282) Rabanus, A.

1931. Die toximetrische Prüfung von Holzkonservierungsmitteln. Angew. Bot. 13:352-371.

From tests with cupric sulfate, zinc chloride, mercuric chloride, sodium fluoride, sodium dichromate, and arsenious acid as timber preservatives, it is evident that the action of a preservative on a fungus in the wood itself cannot be deduced from the reaction to the fungicide of the same organism on malt extract agar.

(283) Rambousek, F.

1931. Letošní stav řepních škůdců (na jaře 1931). Ochr. Rost 9:153-158. [In Czech. Abstract in Rev. Appl. Ent. 20(A): 258. 1932.]

The beet fly (Pegomyia hyoscyami var. betae Curt.) was successfully controlled with a 0.5-percent solution of sodium fluoride applied in large drops, which the flies drink.

(284) Regan, W. S.

1931. Results of insecticide tests for the control of the codling moth and observations on codling moth activity in the Yakima Valley, Washington. Calif. Spray Chem. Co. Research Bull., 30 pp.

Tests with straight barium fluosilicate and Dutox gave results in the control of codling moth equal in every respect, if not actually superior, to tests with lead arsenate. Both 2- and 3-lb. dosages of Dutox in 100 gal. gave excellent results. These compounds must be used with some material to give proper distribution and adhesion to foliage and fruit.

(285) Régnier, P.-R.

1931. Les invasions d'acridiens au Maroc de 1927 a 1931. [Morocco] Dir. Gen. Agr., Comm. et Colonis., Défense des Cultures, [Publ.] No. 3, 139 pp.

Against larvae of Moroccan locusts (Stauronotus maroccanus Thunb.) baits prepared with sodium fluosilicate were about as toxic as sodium arsenite, whereas sodium fluoride was less toxic.

(286) Ripley, L. B. and Hepburn, G. A.

1931. Non-arsenical fruit-fly poisons. Union So. Africa Dept. Agr. Ent. Memo. 7, pp. 17-22.

Sodium fluosilicate in sweetened bait on citrus foilage had a toxicity 16 times that of lead arsenate to the Natal fruit fly (Pterandrus rosa Ksh.). Barium fluosilicate and lead arsenate were about equally toxic. Cryolite, calcium fluosilicate, copper carbonate, and Pulvex (a derris product) are not sufficiently toxic to be useful against the Natal fruit fly.

(287) Roark, R. C.

1931. An index of patented mothproofing materials. U. S. Dept. Agr. Bur. Chem. and Soils Mimeo. Pub., 125 pp.

Some fluorine compounds are listed.

(288) Shuey, G. A.

1931. Report on the analysis of fluorine compounds used as insecticides. Jour. Assoc. Off. Agr. Chem. 14:126-132.

A special reaction flask has been designed permitting the introduction of sulfuric acid (98 to 98.5 percent) without removal of the stopper, thus excluding atmosphere moisture. A detailed description is given of a somewhat modified technique of the method of Reynolds, Ross, and Jacobs. An average recovery of 95.7 percent of the fluorine was obtained.

(289) Simanton, F. L., Dicke, F. G., and Bottger, G. T.

1931. The lethal power of certain insecticides tested in Michigan against the European corn borer. Jour. Econ. Ent. 24:395-404.

The following insecticides were tested: Lead diarsenate, calcium arsenate, barium fluosilicate, calcium fluosilicate, sodium fluosilicate, nicotine, pyrethrum preparations, talc, and 11 fluorides and fluoaluminates. The materials were applied as sprays with power sprayers and as dusts with hand dusters. Of the fluosilicates, calcium fluosilicate gave best control with least plant injury. The fluorides and fluoaluminates gave very good results with one application. The other materials were generally unsatisfactory. Insecticides applied as sprays were usually more effective than as dusts, but sprays generally caused greater plant injury. The addition of stabilizers, carriers, diluents, adhesives, and spreaders to insecticides did not improve their effectiveness.

(290) Sinitzkii, N., Shekera, E., and Levkovtzeva, V.

1931. Comparative tests of the effect of sodium fluoride, sodium fluosilicate and barium chloride on the beet-root weevil (Bothynoderes punctiventris). Nauk. Zapiski Tzukrovoi. Prom. 13(3):831-842. [In Russian with English summary. Abstract in Rev. Appl. Ent. 20(A):203. 1932.]

Fluorine compounds are slower in action than barium chloride but less affected by wet weather. These weevils stop feeding more quickly with the fluorine compounds. Best concentrations are about 0.7 percent; in concentrations above 1 percent they scorched the beet plants. Some evidence is shown that fluoride was more toxic than fluosilicate.

(291) Smit, B.

1931. A study of the sheep blow-flies of South Africa. Union So. Africa Dept. Agr. Dir. Vet. Serv. and Anim. Indus. Rept. 17:299-421.

Full-grown maggots of the various species of sheep blowfly are remarkably resistant to poisoning by direct contact with sodium fluoride.

(292) Smith, C. M., Hamilton, E. H., and Graham, J. J. T.

1931. A study of the Travers method for the estimation of fluorine with reference to insecticides. Jour. Assoc. Off. Agr. Chem. 14:253-260.

A modification of the Travers method was developed and found satisfactory for the analysis of sodium fluoride alone, and in mixtures with many of the ingredients ordinarily found in proprietary insecticides. Iron, aluminum, and boron compounds interfere.

(293) Smith, M. C., Lantz, E. M., and Smith, H. V.

1931. The cause of mottled enamel. Science 74:244.
The cause of mottled enamel of the teeth is held to be due to the presence of fluorine in the water supplies.

(294) Smith, M. C., Lantz, E. M., and Smith, H. V.

1931. The cause of mottled enamel. A defect of human teeth. Ariz. Agr. Expt. Sta. Tech. Bull. 32:253-282.
The presence of fluorine in the water supply was proved to be the source of the trouble known as mottled enamel of teeth by the production of a condition similar, if not identical, to mottled enamel in experimental animals.

(295) Speyer, E. R.

1931. Tomato-moth caterpillar (Polia oleracea L.) Nursery and Market Gard. Indus. Devlpmt. Soc., Expt. and Res. Sta. Ann. Rept. 16:69-70.
Experiments on the control of this pest proved sodium fluosilicate to be toxic to tomato foliage. Barium fluosilicate was not injurious, but was not toxic to larvae. Aluminum fluosilicate was toxic to larvae and not injurious to plants, but too expensive. Most satisfactory results were obtained with synthetic cryolite, 6 lb. to 100 gal., with 2 oz. of saponin.

(296) Stone, I.

1931. Determination of fluorides using the zirconium lake of alizarin. Jour. Chem. Ed. 8:347-349.
To prepare the lake, mix a solution of 0.5 g. of alizarin in 200 cc. of alcohol with one of 1.5 g. of zirconium chloride in 75 cc. of alcohol, filter, and wash with alcohol. Suspend the moist precipitate in alcohol to make 25 cc. and as reagent use 5 cc. of this suspension with 100 cc. of water. To 2.5 cc. of the solution to be tested add an equal volume of concentrated hydrochloric acid and 0.5 cc. of the reagent. If the solution contains more than 0.3 mg. of fluorine, the red color will turn yellow almost immediately. Any oxidizing agent that liberates chlorine from hydrochloric acid interferes.

(297) Stracener, C. L.

1931. Economic importance of the salt-marsh caterpillar (Estigmene acraea Drury) in Louisiana. Jour. Econ. Ent. 24:835-838.
Sodium fluosilicate has considerable advantage over arsenicals in control of salt marsh caterpillars. Three heavy applications within 8 days while the dew was on the plants did not cause any burning of cotton foliage.

(298) Suzuki, H., and Nakamura, S.

1931. [Deodorizing insecticide.] Japanese patent 92,937; issued Sept. 25; [In Japanese. Abstract in Chem. Abs. 26:4408. 1932.]

The insecticide is a mixture of bleaching powder kieselguhr and powdered fluor spar.

(299) United States Department of Agriculture, Bureau of Entomology.

1931. European earwig. U. S. Dept. Agr., Bureau Ent., Ann. Rept. 1931:39-40.

Against the European earwig (Forficula auricularia L.) potassium fluosilicate was found to be the most effective of 54 poisons tested against it in a bait with bran and fish oil.

(300) Whitcomb, W. D.

1931. Control of root weevils on taxus and other nursery plants. Natl. Nurseryman 39(11):5-6.

Commercial poisoned apple baits containing sodium fluosilicate are effective against the large strawberry root weevil or black vine weevil (Brachyrhinus sulcatus) and the small strawberry root weevil (B. ovatus).

(301) Wilkinson, H.

1931. The control of the cutworm. Kenya Colony Dept. Agr. Bull. 12, 5 pp.

Against the cutworms Euxoa segetis Schf., E. spinifera Hbn., Polia inferior Guen., and Prodena litura F. a poison bait of sodium fluoride and chopped prickly pear is recommended, and the method of preparation is given.

(302) Wolman, E. H., and Pflug, H.

1931. Über Holzkonservierung mit wasserlöslichen Salzen. Ztschr. Angew. Chem. 44:696-698.

A new preservative, Thanalith U, composed of fluorine and arsenic salts, dinitrophenol, and chromium salts, is described. Toxicity tests show that wood treated with a 2-percent, or even 1-percent, solution of Thanalith U is immune from attack by Coniophora cerebella and Polyporus vaporarius.

(303) Wymore, F. H.

1931. The effect of insecticides on truck crops. Calif. Dept. Agr. Monthly Bull. 20:185-188.

A general discussion on arsenicals, sulfur, and the fluosilicates is given. The use of fluosilicates is not recommended because of bad burning of foliage.

(304) Abel, E. G.

1932. Über Holzkonservierung mit wasserlöslichen Salzen. Ztschr. Angew. Chem. 45:108-109.

Exception is taken to statement of Wolman and Pflug that Fluralsil can be leached out of wood to the extent of 90 percent. Fluralsil is claimed to contain other fungicides besides zinc fluosilicate. Tests show that 70 percent of the Fluralsil is fixed by the wood fibers and unleachable by water.

(305) Andrewartha, H. G.

1932. The apple curculio: its control by a poison bait. Jour. Dept. Agr. West Aust. 9:104-105.

For control of Otiorrhynchus cribricollis a bait of 9 lb. of dried apple and 1 lb. of sodium fluoride is recommended.

(306) Attia, R.

1932. A study of sodium fluosilicate with special reference to its toxicity to farm animals. Egypt Min. Agr., Tech. and Sci. Serv. Bull. 105, 38 pp.

Wheat dusted with sodium fluosilicate was placed in jars and artificially infested with either Calandra [sic] oryzae or Tribolium confusum. Sodium fluosilicate gave perfect control of Calandra oryzae in 2 to 3 weeks even with as little as 1 part per 3,000 parts of grain. Tribolium confusum was more resistant. The germination of wheat was seriously affected, especially at higher concentrations. Sodium fluoride in all proportions up to 1 to 2,500 was more toxic than sodium fluosilicate to Calandra oryzae, giving almost complete control in 1 week. The repellent action and toxicity of sodium fluosilicate was tested on rabbits and goats.

(307) Back, E. A.

1932. Silverfish as a pest of the household. U. S. Dept. Agr. Farmer's Bull. 1665, 5 pp.

An effective poison powder is made by mixing 12 parts of sodium fluoride with 100 parts of wheat flour. A paste consisting of 1/2-3/4 oz. of white arsenic with 1 pint of wheat flour and enough water to make a paste is also effective.

(308) Baerg, W. J.

1932. The strawberry weevil. Ark. Agr. Expt. Sta. Ann. Rept. 44 (Bull. 280):41-42.

Against the strawberry weevil calcium fluosilicate compound was used without damage to the plants and appeared to give control equal to that obtained with lead arsenate and hydrated lime (1:2).

(309) Ballard, E., Mistikawi, A. M., and El Zoheiry, M. S.

1932. The desert locust, Schistocerca gregaria Forsk., in Egypt. Egypt Min. Agr. Tech. and Sci. Serv. Bull. 110, 149 pp.

Good control was obtained by dusting plants with sodium fluosilicate. Sodium fluosilicate was less effective as bait than sodium arsenite and when used at 4 percent was definitely repellent.

(310) Barrett, R. E.

1932. Relative toxicity of some dusts to Carpocapsa pomonella. Jour. Econ. Ent. 25:859-863.

Of nine fluorine compounds tested on English walnut trees, barium fluosilicate and synthetic cryolite showed promise. Talc was a better diluent than lime for these compounds. A mixture of 35 percent of either of these materials plus 65 percent of talc is recommended. Walnut trees were dusted with fluorine compounds at the rate of 2 lb. per tree. Barium fluoride, magnesium fluosilicate, sodium fluoride, and zinc magnesium fluosilicate entirely defoliated the trees and killed the current year's wood. Sodium fluosilicate scorched the tips and margins of the leaves but did not cause serious defoliation. Barium fluosilicate and synthetic cryolite were harmless to foliage.

(311) Blanchard, R. A., and Conger, C. B.

1932. Notes on Prodenia praefica Grote. Jour. Econ. Ent. 25: 1059-1070.

Baits containing 1 lb. of sodium fluoride to 25 lb. of wheat bran plus 2 lb. of molasses gave good control in experiments.

(312) Blunck, H., and Kaufmann, O.

1932. Die Rübenfliege und ihre Bekämpfung. Deut. Zuckerindus. 57:491-492, 534-535.

Eggs and pupae of Pegomyia hyoscyami. Panz. are not greatly harmed by contact insecticides. The larvae may be killed by 5 to 6 percent barium chloride solution or 0.15 percent nicotine spray (40 gal. per acre), but it is more advisable to destroy the flies with a bait spray containing 0.3 to 0.4 percent sodium fluoride and 2 percent sugar.

(313) Bogdanov-Kat'kov, N. N.

1932. Révision des Hymenoptères nuisibles aux plantes potagères. Bull. Leningrad Inst. Controll. Em. For. Pests 3:149. [In Russian. Abstract in Rev. Appl. Ent. (A) 21:120. 1933.]

On vegetable and root crops a 2-percent solution of sodium fluoride greatly decreased the number of sawfly larvae.

(314) Boyce, A. M.

1932. Mortality of Rhagoletis completa Cress. (Diptera: Trypetidae) through ingestion of certain solid materials. Jour. Econ. Ent. 25:1053-1059.

Ingestion studies in which lead arsenate, barium fluosilicate, cryolite, copper carbonate, hydrated lime, talc, diatomaceous earth, bentonite, sulfur, and ground tobacco leaves were employed demonstrated that adult walnut husk flies actually take undissolved particles into the stomach. Results of toxicity studies are graphically represented. Barium fluosilicate and cryolite were superior to lead arsenate and similar to each other in speed of toxic action.

(315) Bredemann, G., and Radeloff, H.

1932. Zur Diagnose von Fluor-Rauchschäden. Phytopath. Ztschr. 5:195-206. Fortschr. Landw. 8:88-89.

Positive identification of fluorine smoke injury to plants cannot be obtained by botanical and pathological examinations alone. Fluorine can be detected in the leaves of smoke-damaged plants by the microchemical method of Feigl and Krumholz and by the method of precipitation as sodium fluosilicate. Fluorine naturally present in the leaves does not interfere in the precipitation method. Ordinary soils do not contain significant amounts of dissolved fluorine compounds. Vegetation experiments in garden soil and sand treated with various amounts of fluorine compounds showed that fluorine is fixed to a greater extent in soil than in sand.

(316) California Agricultural Experiment Station.

1932. [The walnut husk fly.] Calif. Agr. Expt. Sta. Rept. 1930-31: 39.

Toxicity studies showed cryolite to be equal to barium fluosilicate for the control of the walnut husk fly.

(317) California Agricultural Experiment Station.

1932. [The garden centipede.] Calif. Agr. Expt. Sta. Rept. 1930-31:69.

Investigations on the control of the garden centipede (Scutigerella immaculata Newp.) showed that calcium and sodium fluosilicates and sodium fluoride were practically ineffective.

(318) California Agricultural Experiment Station.

1932. [The pepper weevil.] Calif. Agr. Expt. Sta. Rept. 1930-31: 69.

Barium fluosilicate gave indication of being the best insecticide yet tried for control of the pepper weevil (Anthonomus eugenii Cano), but there is some question of its burning the plants.

(319) California Agricultural Experiment Station.

1932. [The vegetable weevil.] Calif. Agr. Expt. Sta. Rept. 1930-31:71-72.

The vegetable weevil (Listroderes obliquus Gyll.) was successfully controlled by dusting with sodium or barium fluosilicate.

(320) Carter, R. H.

1932. Calcium fluosilicate compound is not calcium fluosilicate. Jour. Econ. Ent. 25:707-709.

The material being used by most entomologists under the name "calcium fluosilicate" is a complex byproduct of the phosphate fertilizer industry. A commercial sample of this material gave the following analysis: Calcium 16.4, fluorine 11.6, total water-soluble fluorine 9.8, phosphorus pentoxide 27.3, iron and aluminum oxides as Fe_2O_3 18.2 percent; silicon and water present. It was strongly acid in reaction.

(321) Carter, R. H.

1932. The chemical composition of commercially available fluorine compounds. Jour. Econ. Ent. 25:1224-1227.

Determination of the chemical composition of samples of 14 commercial fluorine compounds (sodium, potassium, ammonium, barium, strontium, and calcium fluorides; sodium and ammonium acid fluorides; sodium, barium, magnesium, and zinc fluosilicates; and sodium and potassium fluoaluminates) showed that all but three (potassium fluoride, barium fluosilicate, and sodium fluoaluminate) were 90 to 100 percent pure. Sodium fluoride, sodium and barium fluosilicates, sodium and potassium fluoaluminates, and "calcium fluosilicate compound" are now available, and their physical properties have been improved to make them satisfactory for spraying and dusting.

(322) Carter, R. H.

1932. The incompatability of barium fluosilicate and nicotine sulfate. (Sci. Note) Jour. Econ. Ent. 25:1242-1243.

Nicotine sulfate and barium fluosilicate in solution react to form insoluble barium sulfate and probably nicotine fluosilicate.

(323) Carter, R. H.

1932. Fluorine residues on apples. (Sci. Note) Jour. Econ. Ent. 25:1243-1244.

Maximum residue obtained from heavy spraying with barium fluosilicate was 0.927 grain of barium fluosilicate (≈0.378 grain of fluorine) per pound. Residue from normal spraying (4 to 5 covers) was 0.15 grain of barium fluosilicate (≈ 0.061 grain of fluorine). Commercial washing processes removed 75 percent of this residue, leaving a fluorine residue of 0.015 grain of fluorine per pound. Other fluorine compounds used in apple-orchard spraying contain a larger percentage of fluorine and perhaps leave larger residues on sprayed fruit.

(324) Chamberlin, F. S.

1932. The apparent incompatibility of barium fluosilicate and nicotine sulphate. (Sci. Note) Jour. Econ. Ent. 25:135.

A mixture of barium fluosilicate 1.5 lb., nicotine fulfate 12 oz., and water 50 gal. caused severe injury to tobacco. Used separately the ingredients did not injure this plant.

(325) Cummins, J. E.

1932. The preservative treatment of fence posts. Aust. Advisory Council Sci. and Indus. Research, Pamphlet 24, 34 pp.

A mixture of sodium fluoride or zinc chloride and arsenic trioxide gave satisfactory protection from decay and termites and other insects.

(326) Fergusson, H.

1932. Wood preservation, notes on recent development. Chem. Trade Jour. 91:100-101.

A brief review of well-known processes for the treatment of green and dry timber. In recent years fluorides or fluosilicates have been used with the addition of dinitrocresol or salicylic acid.

(327) Feytaud, J.

1932. Un nouvel appât pour la destruction des courtilières. Rev. Zool. Agr. et Appl. 31:105-107.

The bait of rice and barium fluosilicate recommended by Malenotti against mole crickets is described and its cost in Italy and France is discussed.

(328) Florida Agricultural Experiment Station.

1932. Insects of citrus. Fla. Agr. Expt. Sta. Ann. Rept. 1931-32: 71-73.

In experiments against the "bird" grasshopper (Schistocerca americana) in citrus groves baits of 50 lb. bran, 10 to 15 grapefruit, 1 gal. syrup, and 2 lb. sodium fluoride or 3 lb. sodium fluosilicate gave 100-percent mortality in the laboratory; and the fluosilicate bait gave 84-percent mortality in the field. A dust containing 18 percent sodium fluosilicate gave 100-percent control in 6 days when both plants and grasshoppers were dusted, but it did not adhere well to the leaves. A spray of 4 lb. sodium aluminum fluoride in 100 gal. water was unsatisfactory.

(329) Frost, S. W.

1932. Preliminary experiments with new spray materials against the oriental fruit moth. Jour. Econ. Ent. 25:381-385.

Lead arsenate petroleum oil emulsions (1 percent oil) and sodium aluminum fluoride were tested in the laboratory and field on Laspeyresia molesta. The oil emulsions killed a high percentage of the newly hatched larvae, in some cases without apparent foliage injury. Their use, however, presents a residue problem and they tend to discolor the fruit. A spray of sodium aluminum fluoride (3 lb. per 100 gal.) did not give effective control of this insect and caused considerable foliage injury.

(330) Goetze, G., and Schleusener, W.

1932. Versuche zur Bekämpfung der Weidenblattkäfer. Ztschr. Pflanzenkrank. 42:49-58.

For controlling the willow beetle (Phyllodecta vulgatissina L.) a spray containing 0.5 percent of sodium fluoride and 2 percent of sugar is recommended.

(331) Golding, F. D.

1932. Sodium fluosilicate as a poison against the hoppers of Locusta migratoria migratorioides, R. and F., in Nigeria. Bull. Ent. Research 23:449-461.

Sodium fluosilicate was as effective as sodium arsenite in baits when used at the same concentration (2.44 percent), but slower in action. Sodium fluosilicate was less toxic than sodium arsenite to stock, but the degree of safety was not so great as popularly supposed. Baits containing sodium fluosilicate was repellent to animals, whereas sodium arsenite was attractive.

(332) Habegger, H.

1932. Imprägnierverfahren zur Konservierung von Bauholz, Leitungsmasten und dergleichen. Swiss patent 152,022; issued April 1; appl. Aug. 18, 1931.

Wood is preserved by impregnation with sodium salt solutions, including those of sodium fluoride.

(333) Hammer, O. H.

1932. Studies on control of the apple curculio in the Champlain Valley. Jour. Econ. Ent. 25:569-575.

Control measures recommended against Tachypterellus quadrigibbus Say are use of cryolite and lead arsenate for late summer feeding by the new generation.

(334) Hatfield, I.

1932. Further experiments with chemicals suggested as possible wood preservatives. Amer. Wood Preservers' Assoc. Proc. 1932:330-339. [Abstract in Chem. Abs. 27:2553. 1933.]

Toximetric determinations were made with 60 compounds. There wood-destroying and six wood-staining fungi were used. Five groups of compounds were tested, one of which included fluorine compounds.

(335) I. G. Farbenindustrie, A.-G.

1932. Verfahren zur Darstellung von Acidatofluorborsäuren und ihren Salzen. German patent 551,513; issued June 1; appl. Oct. 18, 1927.

Acids and salts of chloroacetatofluoboric acid, lactatofluoboric acid, oleolactofluoboric acid, and benzoatofluoboric acid are used as fungicides and insecticides.

(336) Indiana Agricultural Experiment Station.

1932. Cucumber beetles. Ind. Agr. Expt. Sta. Rept. 44:35.

A single dusting with barium fluosilicate (80 percent), alone, or with an equal quantity of inert material such as talc, at the rate of 10-15 lb. per acre gave good control of striped and spotted cucumber beetles, always killing 75 percent in 12 hours and in most tests 100 percent in 24 hours.

(337) Indiana Agricultural Experiment Station.

1932. European corn borer. Ind. Agr. Expt. Sta. Rept. 44:36-37.

Barium fluosilicate mixed with talc was more effective against the European corn borer than any other dust ever tested. Applied as a spray it gave over 85 percent control and, though producing a mottled appearance or bleaching of the leaves, did not apparently reduce the crop yield.

(338) Kaltenbach, R. G.

1932. Étude sur les poudrages antidoryphoriques. 70 pp. Paris. [Abstract in Rev. Appl. Ent. (A)21:636. 1933.]

Experiments on the control of Leptinotarsa decemlineata Say on potato with arsenic and fluorine compounds are summarized. It is concluded that barium fluosilicate is likely to replace arsenic compounds on the grounds of efficiency, economy, and freedom from legislative restrictions.

(339) König, J., and Mengele, H.

1932. Zur Holzkonservierung mit Silicofluoriden. Ztschr. Angew. Chem. 45:280-281.

Tests carried out with Hydrarsil, a new wood preservative consisting of zinc fluosilicate and mercury fluosilicate, showed that from 70 to 80 percent of the zinc and 90 percent of the mercury were fixed by the wood, thus confirming the results of Abel as to zinc fluosilicate. Tests also showed that wood treated with mercuric chloride in aqueous solution fixed approximately 90 percent of the mercury.

(340) König, J., and Mengele, H.

1932. Verfahren zur Herstellung eines Pflanzenschädlingsbekämpfungsmittel. German patent 557,054; issued Aug. 18; appl. June 20, 1931.

An insecticide is prepared by precipitating an insoluble copper compound in a suspension of a freshly precipitated fluosilicate.

(341) List, G. M.

1932. A cherry pest in Colorado. Colo. Agr. Expt. Sta. Bull. 385. 106 pp.

Sodium fluosilicate was almost as effective as lead arsenate against the cherry curculio (Tachypterellus consors cerasi, n. subsp.), but was not so effective against the cherry slug (Eriocampoides limacina Retz.) or against Grapholitha packardi Zell.

(342) Lovell, O. H.

1932. The vegetable weevil, Listroderes obliquus. Calif. Agr. Expt. Sta. Bull. 546, 19 pp.

Sodium fluosilicate dust is effective in controlling both adults and larvae of the vegetable weevil on carrots, turnips, spinach, and tomato, with only slight injury to the plants even when wet, but it causes severe scorching of potato foliage. Barium fluosilicate can be used with safety even on potato but is more expensive and slower in action.

(343) McCulloch, R. N.

1932. Jetting for the reduction of sheep blowfly attack. Agr. Gaz. N. S. Wales 43:565-573.

Sodium fluosilicate gave less protection than arsenicals against blowflies on sheep.

(344) McNeel, T. E.

1932. Observations on the biology of Mansonia perturbans (Walk.). Diptera, Culicidae. N. J. Mosquito Extermin. Assoc. Proc. 19:91-96.

In laboratory tests fairly satisfactory control of larvae was obtained with sodium fluosilicate, but in the field this material was entirely unsatisfactory.

(345) Mackie, D. B.

1932. Entomology and pest control. Calif. Dept. Agr. Monthly Bull. 21:474-488.

The use of 70 percent sodium fluosilicate dusted over sacks or used as a barrier proved of value in preventing the granary weevil from migrating to new grain in warehouses.

(346) Malenotti, E.

1932. Grillotalpe morte e uccelli vivi. Coltivatore 78:147-150.

Barium fluosilicate was as effective as zinc phosphide when used as poison bait against Gryllotalpa gryllotalpa L., and barium fluosilicate was harmless to poultry.

(347) Marcovitch, S.

1932. The residue problem and fluorine compounds. (Scien. Note) Jour. Econ. Ent. 25:141-142.

Although fluorine and arsenic compounds have high acute toxicity to mammals as to chronic toxicity, fluorine compounds are at least 100,000 times safer than lead arsenate.

(348) Marshall, H. L., Jacobs, K. D., and Reynolds, D. S.

1932. Occurrence of fluorine in natural phosphates. Indus. and Engin. Chem. 24:86-89.

Analyses of 137 samples from 34 localities in countries throughout the world indicate that fluorine is a characteristic constituent of phosphate rock. It occurs in quantities ranging from about 0.40 to 4.25 percent of the sample. In general, commercial phosphate rock from continental deposits is characterized by relatively high fluorine-phosphoric acid ratios, about 0.090 to 0.140, while samples from island deposits have relatively low ratios, about 0.010 to 0.085.

(349) Mayne, R.

1932. Rapport sur des essais de destruction de la mouche de la betterave. Ann. Gembloux 38:164-168.

In field tests against the beet fly (Pegomyia hyosciami var. betae Curt.) satisfactory results were obtained by application to the foliage of a bait spray consisting of 20 lb. of sugar, 3/4 lb. of sodium fluoride, and 100 gal. of water at the rate of about 6-1/2 gal. per acre.

(350) Munro, J. A., and Carruth, L. A.

1932. Insecticidal control of the common black field cricket (Gryllus assimilis Fabr.). Jour. Econ. Ent. 25:896-902.

Sodium fluosilicate was the most effective poison tested in a bran bait for the control of this cricket. Sodium fluoride was second in rank. Arsenicals and thallium sulfate were unsatisfactory.

(351) Mysore Department of Agriculture.

1932. Epilachna viginti octo punctata, Fb.0 on potato. Mysore Agr. Dept. Rept. 1930-31:28.

Experiments in control of this pest on potato showed that a dust of 1 lb. of sodium fluosilicate in 8 lb. of lime will kill 50 to 60 percent of the insects in 2 to 3 days. Road dust was not satisfactory as a carrier.

(352) New Mecico Agricultural Experiment Station.

1932. Codling moth investigations. N. Mex. Agr. Expt. Sta. Ann. Rept. 43:38-42.

Against codling moth (Cydia pomonella L.) sodium fluoaluminate (cryolite) showed promise of good control and the arsenic trioxide residue from earlier sprays of lead arsenate was reduced from an average of 0.043 to 0.001-0.004 grain per lb. of fruit.

(353) Newcomer, E. J.

1932. Results with certain substitutes for lead arsenate for codling moth control in the Pacific Northwest. Blue Anchor (Calif. Fruit Exchange) 9(3):14-15, 25.

Comparative data are given on the control of the codling moth by nicotine-oil, cryolite, barium fluosilicate, and lead arsenate. Nearly all these compounds gave as good control as lead arsenate, or better, but the cost was higher.

(354) Newcomer, E. J., Dean, F. P., and Rolfs, A. R.

1932. A schedule for the control of the codling moth in 1932. Better Fruit 26(8):8-9.

Cryolite and barium fluosilicate are recommended as substitutes for lead arsenate in sprays applied after July.

(355) Nisikawa, Y.

1932. Chemical properties of solutions prepared from sodium fluosilicate-hydrated lime mixtures with special reference to their toxicity to plants. Mem. Col. Agr. Kyoto Imp. Univ. 21. 15 pp. [Abstract in Rev. Appl. Ent. (A) 20:460. 1932.]

The acidity of the solutions, which at the same time represents the content of sodium fluosilicate, decreases with the addition of small amounts of hydrated lime, but their toxic action never diminishes thereby. The strong alkaline solutions from the mixtures with larger amounts of hydrated lime are harmful to vegetation. Mixtures of sodium fluosilicate and hydrated lime used as dusts under wet weather conditions or as sprays will cause severe plant injury. Mixtures containing a large amount of lime will become comparatively safe, but at the same time their toxicity to insects may be reduced.

(356) O'Kane, W. C.

1932. Some problems and developments in control of insects by chemicals. Jour. Econ. Ent. 25:232-243.

Barium fluosilicate, cryolite (both natural and synthetic), and sodium fluoride are mentioned as offering means of control for certain insects.

(357) Quaintance, A. L., and Siegler, E. H.

1932. Insecticides, equipment, and methods for controlling orchard insect pests. U. S. Dept. Agr. Farmers' Bull. 1666. (rev.), 93 pp.

"Several fluorine compounds, such as sodium fluosilicate, barium fluosilicate, potassium fluosilicate, potassium aluminum fluoride, and sodium aluminum fluoride (cryolite), are being used in an experimental way, but as yet have not found a permanent place in orchard spraying." (pp. 5-6)

(358) Richardson, C. H., and Glover, L. H.

1932. Some effects of certain "inert" and toxic substances upon the twelve-spotted cucumber beetle, Diabrotica duodecimpunctata (Fab.). Jour. Econ. Ent. 25:1176-1181.

The effectiveness of dusts, based upon the time required to kill 50 percent of the beetles, was in the following order: Sodium fluosilicate = calcium arsenate > acid lead arsenate > commercial calcium hydroxide = kaolin > gypsum > bentonite.

(359) Richardson, C. H. and Haas, L. E.

1932. The evaluation of stomach poisons for grasshopper baits. Jour. Econ. Ent. 25:1078-1088.

Adults of the red-legged grasshopper and the differential grasshopper were fed determined quantities of bran-molasses water baits which contained known concentrations of arsenious oxide, monosodium arsenite, trisodium arsenite, paris green, acid lead arsenate, sodium fluosilicate, or rotenone. The median lethal dose is approximately the same for the sodium arsenites, paris green, and the sodium fluosilicates and estimated to be about 0.16 mg. per gram of body weight. The M. L. D. for acid lead arsenate is 3.0 and for rotenone 2.0 mg. per gram.

(360) Riesenfeld, E. H.

1932. Verfahren zum Imprägnieren von Holz mit schwerlöslichen, pilztötenden Salzen. German patent 551,196; issued May 28; appl. Dec. 25, 1929.

A relatively dilute solution of a salt having a fungicidal anion, e. g., 0.1N sodium arsenite or 0.2N sodium fluoride, is mixed with a relatively concentrated solution of an alkaline earth or heavy metal salt, e. g., 8N calcium chloride, with or without a protective colloid. The mixture does not form a precipitate immediately, and meanwhile the wood is given a single impregnation with the mixture.

(361) Ripley, L. B., and Petty, B. K.

1932. Possibilities of combating wattle bag-worm with insecticidal dusts. So. African Jour. Sci. 29:544-561.

As determined by laboratory and field experiments, various dusts were effective in controlling the larvae of the wattle bag-worm (Acanthopsyche junodi Heyl).in the following decreasing order: Paris green, sodium ferric fluoride, sodium fluosilicate, natural cryolite, synthetic cryolite, calcium arsenate, barium fluosilicate, calcium fluosilicate, Schweinfurth yellow, copper carbonate, sodium chromic fluoride, and ferric oxide. Because of its high toxicity and repellency, and low solubility and foliage burning, the sodium ferric fluoride was the most promising of the fluorine compounds.

(362) Rukavishnikov, B. I.

1932. The work of the experimental expedition of the Institute for Plant Protection on the control of pests of sugar beet in 1930. Plant Protection, 8 (1931), nos. 5-6, pp. 489-513. [In Russian. Abstract in Rev. Appl. Ent. 20(A):346. 1932.]

Laboratory and field tests on the control of the meadow moth (Loxostege sticticalis L.) and the beet weevil (Bothynoderes punctiventris Germ.) on beets indicated high toxicity for sodium fluoride and sodium fluosilicate.

(363) Ronner, G. A.

1932. Controlling grape insects and the present situation regarding arsenical residue. Ohio State Hort. Soc. Proc. 65: 206-211.

Barium, potassium, and sodium fluosilicates and potassium and sodium fluoaluminates failed to control the grape berry moth and in some cases caused injury to fruit and foliage.

(364) Saline Ludwigschalle.

1932. Procédé de préparation des composés double de fluorure d'aluminium-fluorure alcalin. French patent 717,714; issued Jan. 13; appl. Sept. 12, 1930.

Double fluorides of aluminum and an alkali, such as cryolite, are prepared from the waste produced in the manufacture of aluminum in casting aluminum and from the aluminum foundry. Such waste containing aluminum or aluminum oxide is dissolved in hydrofluoric acid, hydrochloric acid, or sulfuric acid, and the necessary alkali and fluorine ions are added.

(365) Scharrer, K., and Schropp. W.

1932. Die. Wirkung des Fluor-Ions auf Reimung und Jugendwachstum einiger Kulturpflanzen. Landw. Vers. Sta. 114:203-214.

The toxicity of potassium fluoride to cereal crops was relatively low and approximately the same for each crop. Its action was more marked in acid than in neutral soil.

(366) Schmittutz, C.

1932. Method of impregnating wood. British patent 381,030; issued Sept. 29; appl. Dec. 23, 1931.

Freshly cut wood is stripped of bark, coated with a water-solution impregnating substance in pasty form, and left coated till dry. Suitable compositions comprise sodium fluoride and dinitrophenol with gum arabic, casein, or starch made into paste with water.

(367) Schwalbe, C. G.

1932. Studien zur Holzkonservierung. II. Ztschr. Angew, Chem. 45:223-226.

Freshly felled unbarked spruce and pine logs 5-10 meters in length were treated with a 1-percent sodium fluoride solution by a modified Boucherie process. Pressures of 2-4 atmospheres were applied by means of compressed air or carbon dioxide in portable tanks. Fluorine determinations were made on the wood immediately after treatment and after yarding 3 years. The heartwoods were not penetrated at first by the sodium fluoride solution, but after yarding 3 years there was a marked migration of the salt

(367) Schwalbe, C. G. Continued.

to the very center. Spruce and pine logs when treated green as above showed a greater resistance to wood-destroying fungi than seasoned wood treated by the usual pricess. Treatment of the wood while green has a favorable influence on the strength of the wood.

(368) Shull, W. E.

1932. Control of the cattle louse Bovica bovis Linn. (Mallophaga, Trichodectidae). Jour. Econ. Ent. 25:1208-1211.

Cattle lice may be controlled with sodium fluoride, equal parts of sodium fluoride and diatomaceous earth, diatomaceous earth alone, and commercial insect powders.

(369) Smith, H. V., and Smith, M. C.

1932. Mottled enamel in Arizona and its correlation with the concentration of fluorides in water supplies. Ariz. Agr. Expt. Sta. Tech. Bull. 43:213-287.

The endemic occurrence of mottled enamel of teeth in many sections of Arizona is disclosed, and the presence of fluorides in drinking water is established as the chief causative factor. Concentrations of fluorides above 2.7 parts per million were always associated with mottled enamel.

(370) Smyth, H. F., and Smyth, H. F., Jr.

1932. Relative toxicity of some fluorine and arsenical insecticides. Indus. and Engin. Chem. 24:229-232.

The relative toxicity of fluorine and arsenic insecticides was determined by feeding white rats measured amounts of cryolite, barium fluosilicate, and lead arsenate mixed with their food, for 16 weeks. In behavior, appetite, fecundity, growth, tooth development, and organ pathology the results agree in indicating the arsenic compounds to be several times as toxic as the fluorine compounds. Fluorine insecticides leave a much wider margin of safety than do arsenic materials between the weight of spray residue on the fruit and the amount toxic to the consumer.

(371) Snapp, O. I., and Thomson, J. R.

1932. A progress report on feeding tests and spraying and dusting experiments for the control of the plum curculio. Jour. Econ. Ent. 25:811-815.

Potassium fluosilicate (2 lb. in 50 gal.) was more effective than acid lead arsenate (1 lb. in 50 gal.) and somewhat more effective than barium fluosilicate and sodium fluoaluminate. Wettable sulfur increased and carbon disulfide decreased the toxicity of potassium fluosilicate. Lead arsenate sprays were more injurious to peach foliage than those of potassium fluosilicate, barium fluosilicate, or cryolite.

(372) Sorenson, C. J.

1932. Insects in relation to alfalfa-seed production. Utah Agr. Expt. Sta. Cir. 98, 28 pp.

Control measures suggested for adults of blister beetles, Epicauta sericea Lec., include a dust of sodium fluosilicate and hydrated lime.

(373) Tanganyika Territory Department of Agriculture

1932. Food crop pests. Tanganyika Terr. Dept. Agr. Rept. 1931:30.

Maize was protected from the armyworm Laphygma exempta Wlk. by dusting with sodium fluosilicate. Sodium fluosilicate was found to injure beans when applied against the beetle Ootheca bennigseni Weis.

(374) Turner, N.

1932. The Mexican bean beetle in Connecticut. Jour. Econ. Ent. 25:617-620.

Magnesium arsenate was the most effective insecticide used in spray form. Barium fluosilicate and magnesium arsenate used as dusts were equally effective.

(375) Anonymous.

1933. Spritzschäden an Kirschen durch Verwendung von Fluornatrium zur Bekämpfung der Kirschfliege. Nachrblatt. Deut. Pflanzenschutzdienst 13:63-64.

Bait sprays containing 0.4 percent of sodium fluoride with either 2 percent of sugar or 4 percent of molasses were used in Germany in 1931 and 1932 against the cherry fly without causing any injury to the trees. In 1933, however, fruits and leaves on branches heavily sprayed in June were scorched. The sprays should be applied lightly, through wetting being avoided.

(376) Armstrong, W. D.

1933. Colorimetric determination of fluorine. Indus. and Engin. Chem., Analyt. Ed. 5:300-302.

Utilization of the bleaching action of soluble fluorides on a colored ferric compound, in this case ferric acetylacetone, is suggested.

(377) Armstrong, W. D.

1933. Modification of the Willard-Winter method for fluorine determination. [Communication to the editor.] Jour. Amer. Chem. Soc. 55:1741-1742.

The use of sodium alizarin sulfonate as indicator in place of zirconium lake of alizarin is recommended.

(378) Bourne, A. I.

1933. Investigation of materials which promise value in insect control. Mass. Agr. Expt. Sta. Ann. Rept. 1932 (Bull. 293):28-30.

Against the Mexican bean beetle barium fluosilicate caused slight injury to beans in midsummer, but it may constitute a possible alternative for arsenicals where there is a residue problem.

(379) Boyce, A. M.

1933. Control of the walnut husk fly, Rhagoletis completa Cress. Jour. Econ. Ent. 26:819-825.

On the basis of data obtained in field plots in 1928-1932 the following formulas are recommended: 3 lb. of synthetic cryolite (97 percent) or barium fluosilicate and 1 qt. of mineral oil to 100 gal. of water sprayed at the rate of 30-40 gal. to an average-sized walnut tree, or 30 percent by weight of synthetic cryolite or barium fluosilicate, 65 percent of diatomaceous earth and 5 percent of mineral oil dusted at the rate of 3-4 lb. per tree.

(380) Britton, W. E.

1933. Studies on the potato flea beetle. Conn. State Ent. Rept. 32 (Conn. Agr. Expt. Sta. Bull. 349):448-449.

In field tests on the potato flea beetle (Epitrix cucumeris Harr.) plots sprayed with barium fluosilicate produced no greater yield of potatoes than unsprayed plots.

(381) Bucalossi, E.

1933. Combating mole cricket (Curtilla gryllotalpa) with Floris (barium fluosilicate). Bol. Ist. Super. Agrar. Pisa 9:188-194. [Abstract in Chem. Abs. 28:4531. 1934.]

Good results were obtained.

(382) Caffrey, D. J., and Worthley, L. H.

1933. The European corn borer situation in the United States at the close of 1932. Jour. Econ. Ent. 26:85-102.

F. L. Simanton, testing various insecticides under one-generation conditions, reports that the best results on dent field corn were obtained with 6 lb. of calcium fluosilicate compound in 100 gal. of a 2 percent mineral oil emulsion. Reduction of 85 percent of the larval population with one application was accomplished.

(383) Ceylon Department of Agriculture.

1933. Termites affecting plants of economic importance. Ceylon Dept. Agr., Dir. Agr. Admin. Rept. 1932:D125-D127.

The termite Neotermes militaris was not successfully controlled by barium fluosilicate.

(384) Chamberlin, F. S.

1933. Barium fluosilicate as a control for the tobacco flea beetle. Jour. Econ. Ent. 26:233-236.

In field experiments in 1931 a mixture of 80 percent barium fluosilicate and 20 percent finely divided infusorial earth gave excellent control with little or no scorching of plants. The white residue was removed by showers. Paris green scorched 30 to 40 percent of the foliage. Sodium fluosilicate gave severe injury. In 1932 excellent control was obtained with dosages ranging from 4 to 8 lb. of a mixture of barium fluosilicate, infusorial earth, and tobacco dust in the proportions of 8:2:2 with two or three applications.

(385) Cox, A. J.

1933. Facts concerning the spray residue problem pertinent to the fruit and vegetable industries. Calif. Dept. Agr. Monthly Bull. 22:389-396.

Fluorides are more readily removed by washing fruits and vegetables in water than are many other spray and dust residues.

(386) Daniels, L. B.

1933. Potato flea-beetle control. Colo. Agr. Expt. Sta. Bull. 400, 34 pp.

Sodium fluoaluminate (Kalite) dusts applied in two to three applications gave very effective control. The dusts were used at the rate of 20 to 30 lb. per acre.

(387) Davis, E. G.

1933. The southwestern corn borer. U. S. Dept. Agr. Tech. Bull. 388, 61 pp.

The value of insecticides for controlling Diatraea grandiosella has not been fully determined, but barium fluosilicate diluted 1:2 with hydrated lime or other carrier has shown some promise.

(388) Decoux, L., and Roland, G.

1933. Étude de la pégomye de la betterave en belgique en 1932. Inst. Belge pour l'Amel. Betterave (Tirlemont) Pub. 4, 142 pp.

The best results against the beet fly (Pegomyia hyoscyani var. betae Curt.) are likely to be obtained by spraying the cereals that follow the beet crop with a sweetened solution of sodium fluoride.

(389) DeEds, F.

1933. Chronic fluorine intoxication. A review. Medicine 12:1-60

The use of fluorine compounds or mixtures containing them as insecticides or fumigants in conjunction with plants or foods should be limited to conditions where fluorine residues can be satisfactorily removed before the food is placed on the market.

(390) DeEds, F.

1933. Comparative toxicities with special reference to arsenical and fluorine-containing insecticides. (Sci.Note) Jour. Econ. Ent. 26:302-304.

Until the lowest possible treshold tolerance for fluorine compounds has been established, and until the fullest use has been made of information to be gleaned from areas where mottling of the teeth is endemic, the wisdom of substituting fluorine insecticides for lead arsenate must remain an open question.

(391) du Pont, E. I., de Nemours and Company.

1933. Insecticides, wood-preserving, disinfectant and the like compositions. British patent 396,064; issued July 17; appl. Oct. 16, 1931.

Insecticidal, wood-preserving, and disinfecting compounds comprise a fluosilicate of an aliphatic or heterocyclic amine and an inert liquid diluent, with or without other active ingredients. According to examples, horticultural insecticides consist of dilute aqueous solutions of the fluosilicates of di-n-butylamine, pyridine, piperidine, or 6-ethoxy-2-amino-benzothiazole together with a small quantity of fish-oil soap or sulfonated oxidized petroleum oil as spreader. Wool, fur, hair, hides, etc., may be rendered mothproof with aqueous solution of di-n-butylamine fluosilicate or quinoline fluosilicate.

(392) Elmore, J. C.

1933. Some tests with fluorine compounds against the pepper weevil, Anthonomus eugenii Cano. Jour. Econ. Ent. 26:1095-1105.

Sodium fluoaluminate, potassium fluoaluminate, and barium fluosilicate mixed with 50 percent talc gave mortalities of 94.4, 82.7, and 71.1 percent respectively. Barium fluosilicate scorched the leaves. Both barium fluosilicate and sodium fluoaluminate caused crop reduction in field tests in 1931. Potassium fluoaluminate was least injurious to plants.

(393) Elvove, J.

1933. Determination of fluorides in water. U. S. Pub. Health Serv., Pub. Health Rept. 48:1219-1222.

A modification of the Zirconium- alizarin method of determining fluorine in water is described. The highest values are found in districts where mottled enamel in teeth is most prevalent.

(394) Ficht, G. A.

1933. A progress report on some insecticides used against the European corn borer. Jour. Econ. Ent. 26:747-754.

Barium fluosilicate (2 lb. of 80-percent material to 100 gal.), alone or in combination with dilute oil emulsions (2 qt. to 100 gal.), gave marked reductions (over 70 percent), but these were accompanied by some injury. Calcium fluosilicate, two applications of which at a concentration of 10 lb. of 15-percent material to 100 gal. gave 73.7 percent reduction, appears to be the most satisfactory of the insecticides tested.

(395) Flint, W. P.

1933. Codling moth experiments during 1932-1933. Ill. State Hort. Soc. Trans. 67:175-183.

In some comparative tests of second-brood sprays 4 lb. of natural cryolite with 1 percent of oil proved nearly as good as lead arsenate and oil, but the residue was almost as hard to remove.

(396) Foster, M. D.

1933. Colorimetric determination of fluoride in water using ferric chloride. Indus. and Engin. Chem. Analyt. Ed. 5:234.

The method is based on the estimation of the bleaching effect of the fluoride ion on the red color produced by interaction of ferric chloride and ammonium thiocyanate. The interference of various ions is duscussed, and methods are given for correcting the errors caused by these ions.

(397) France, Ministère de l'Agriculture, Station de Zoologie Agricole du Sud-Ouest.

1933. Doryphore de la pomme de terre. Ann. Rept. Director. 1932. Ann. Epiphyties 19:19-24.

In field experiments in spraying potatoes against Leptinotarsa decemlineata, dusts containing lead arsenate or calcium arsenate gave better results than those containing barium fluosilicate.

(398) Frere, J.

1933. Determination of fluorine in cryolite. Indus. and Engin. Chem., Analyt. Ed. 5:17-18.

A volumetric method is described for the determination of fluorine in cryolite with yttrium nitrate as a reagent and methyl red as indicator. The method does not succeed with less than 0.025 gram of fluorine per 100 cc., and it is essential to use neutral solutions.

(399) Fulton, B. B.

1933. Naphthalene for midge larvae in tobacco seed beds. (Sci.Note) Jour. Econ. Ent. 26:512-513.

Barium fluosilicate was not effective against the midge larvae in tobacco seed beds.

(400) Greaves, C.

1933. Leaching tests on water-soluble wood preservatives. Canada Dept. Int., Forest Serv. Cir. 36, 15 pp.

If the results for zinc chloride are based on chlorine determination, neither zinc chloride nor sodium fluoride, when present in wood in the concentration generally used in practice, is very resistant to the leaching action of water.

(401) Gwin, C. M.

1933. The past and present status of fluorine containing insecticides. (Sci.Note) Jour. Econ. Ent. 26:996-997.

The literature on the use of fluorine insecticides is reviewed. Recent papers dealing with the chronic toxicity of fluorine to man have resulted in an unwarranted curtailment of research on this subject.

(402) Hammer, O. H.

1933. Further studies on the control of the apple curculio in the Champlain Valley. Jour. Econ. Ent. 26:420-424.

Against the apple curculio (Tachypterellus quadrigibbus) cryolite gave the most promise of a number of materials other than lead arsenate used in preliminary tests.

(403) Hanson, A. J.

1933. The potato flea beetles, Epitrix cucumeris Harris, Epitrix subcrinita Leconte. Wash. Agr. Expt. Sta. Bull. 280, 27 pp.

Barium fluosilicate was the most satisfactory of the fluorine compounds tested. Cryolite and sodium fluosilicate gave better contro of the beetles but severely scorched the foliage. Effectiveness of the fluosilicate was not appreciably reduced by combination with lime.

(404) Haseman, L., and Johnson, P. H.

1933. The use of insecticides. Mo. Agr. Expt. Sta. Bull. 328:29.
Dusts of barium fluosilicate and synthetic cryolite protected cucurbits from infestation by the striped and spotted cucumber beetles. Blister beetles were driven within 3 hours from late potatoes dusted with barium fluosilicate and calcium arsenate, but they reinfested the plants after the insecticide had been washed off by rain.

(405) Himmelsbach, J.

1933. Procédé de cyanisation profonde des bois. French patent 747,212; issued June 13; appl. Dec. 8, 1932.
The impregnating solution (sodium fluoride) is heated and stirred by hot air blown in at the base.

(406) Hixson, E.

[1933?] Boll weevil control investigations. Okla. Agr. Expt. Sta. Rept. 1930-32. 256-265.
Sodium fluosilicate and cryolite were inferior to calcium arsenate in control of the cotton boll weevil.

(407) Hockenyos, G. L.

1933. The mechanism of absorption of sodium fluoride by roaches. Jour. Econ. Ent. 26:1162-1169.
Sodium fluoride was applied to various parts of the bodies of Periplaneta americana and Blatta orientalis. The data indicate that this material can be absorbed directly through the body wall in lethal amounts.

(408) Hough, W. S.

1933. Developments in codling moth control. Va. Fruit 21:88-92.
Excellent control of codling moth on apples was obtained by substituting barium fluosilicate or sodium fluoaluminate for lead arsenate in the July or later sprays. At picking time, however, the fruit showed an excessive amount of arsenic residue from earlier sprays.

(409) Howard, N. F., Brannon, L. W., and Mason, H. C.

1933. Insecticides for the control of the Mexican bean beetle. Jour. Econ. Ent. 26:123-129.
Potassium hexafluoaluminate and cryolite were satisfactory for control of Mexican bean beetle when used in field tests at rate of 3 lb. to 50 gal. of water. Barium fluosilicate (80 percent) must be used at the rate of 5 lb. to 50 gal.; green beans should not be sprayed after the pods have set.

(410) Jancke, O., and Böhmel. W.

1933. Beitrag zur Biologie und Bekämpfung der Kirschfliege. Arb. Biol. Reichsanst. Land u. Forstw. 20:443-456.

In tests against the cherry fly (Rhagoletis cerasi L.) the most effective bait spray was one containing 0.4 percent of sodium fluoride, with sugar or molasses.

(411) Jarvis, H.

1933. Codling moth control experiments, 1930-1933. Queensland Agr. Jour. 40:25-34.

White oil, nicotine sulfate-white oil and Katakilla-white oil sprays were slightly more efficient than lead arsenate sprays. Barium fluosilicate was less efficient but gave 92.8 percent control of codling moth on apples.

(412) Kearns, H. G. H., and Walton, C. L.

1933. A note on the control of the raspberry beetle (Byturus tomentosus Fabr.) by means of a barium silicofluoride wash. Jour. Pomol. and Hort. Sci. 11:77-80. [Abstract in Rev. appl. Ent. (A)21:295-296. 1933.]

A single application of a spray of 12 lb. of barium fluosilicate and 10 lb. of soft soap in 100 gal. of water reduced the infestation on raspberries from 29.2 percent to 4.7 percent. It did not produce any visible deposit on the berries or foliage but scorched a number of leaves.

(413) König, J., and Bornemann, F.

1933. Verfahren zur Unkrautbekämpfung. German patent 572,101; issued March 10; appl. Arpil 17, 1932.

For destroying weeds use is made of solutions or solid compounds containing fluosilicates of iron, copper, zinc, or other heavy metal.

(414) Korab, I. I., and Zalkind, M. D.

1933. The effect of insecticides upon sugar-beet leaves. Nauk. Zapiski Tzukrovoi Prom. 10(28):55-62. [In Russian. Abstract in Chem. Abs. 27:5876. 1933.]

Several insecticides were applied to sugar-beet leaves. Sodium fluoride in 1.5 percent concentration did not affect the green tissue of the leaf but in 2-percent concentration it burned; 2-percent concentration of sodium fluosilicate was harmless to the leaves.

(415) Körting, A.

1933. Untersuchungen über die insektizide Wirkung einiger Fluorverbindungen. Ztschr. Pflanzenkrank. 43:502-516.

A rapid and intense toxicity to bees was shown by potassium fluosilicate, sodium fluoride, and potassium fluoride. Sodium fluosilicate was slower in action and less toxic. Barium fluosilicate showed a similar order of toxicity but less rapid killing. Cryolite and calcium fluoride were less effective. The order of rapidity of action was potassium fluosilicate, sodium fluoride, potassium fluoride, sodium fluosilicate, barium fluosilicate, calcium fluoride, cryolite. Potassium fluosilicate, sodium fluoride, potassium fluoride, barium fluosilicate, and sodium cryolite gave mortality of 100 percent of bees in nearly all cases.

(416) Lloyd, D. J.

1933. Berichte über die Verwendung von Fluoriden bei der Häutekonservierung. Collegium 763:698-700.

Edible gelatin prepared from hides cured with 99 percent sodium chloride plus 1 percent sodium fluoride did not contain enough fluorine to be harmful to health even though its effect is cumulative.

(417) MacCreary, D.

1933. The efficiency of certain proprietary oil emulsions. Volck and Orthol-K, for control of the oriental fruit moth. Del. Agr. Expt. Sta. Bull. 184, 43 pp.

A combination of oil, Cal-Mo-Sul, and Dutox (barium fluosilicate) killed practically 100 percent of the eggs.

(418) McKenzie, H. L.

1933. Observations on the Genista caterpillar, Tholeria reversalis Guenee (Lepidoptera, Pyralidae). Calif. Dept. Agr. Monthly Bull. 22:410-412.

The larvae may be controlled by two applications of a spray of 4 to 6 tablespoonfuls of synthetic cryolite to 1 gal. of water or a dust of 30 percent synthetic cryolite and 70 percent diatomaceous earth.

(419) Malenotti, E.

1933. Un nuovo ed efficace mezzo di lotta contro le tipule. Coltivatore 79:65-69.

Serious injury to wheat in northern Italy was caused by larvae of Tipula oleracea L. Experiments have shown that a poison bait of 100 parts wheat bran, 90 parts water, and 5 parts barium fluosilicate is effective when scattered at the rate of about 40 lb. per acre. This bait is harmless to poultry and other birds.

(420) Malenotti, E.

1933. Fluorosilicato di bario e tipule. Coltivatore 79:266-268.

Successful experiments against Tipula oleracea L. with a bran bait poisoned with barium fluosilicate in northern Italy have been followed by its use in spring in tobacco fields to protect the seedlings. Excellent results were obtained without any scorching of the tender plants. The same bait proved effective against cutworms when strewn on the ground a few days before the tobacco seedlings were planted.

(421) Malenotti, E.

1933. Contro la "Cydia pomonella" L. Italia Agr. 69:387-403.

Against the codling moth barium fluosilicate proved ineffective as a spray, possibly owing to the rains.

(422) Marcovitch, S.

1933. How to combat certain pests of the household. Tenn. Agr. Expt. Sta. Bull. 147, 19 pp.

The soaking of woolens, including carpets, upholstered furniture, etc., with a solution of 1 oz. sodium fluosilicate to 1 gal. water protects them against clothes moths (Tinea pellionella, Tineola biselliella), and the carpet beetle (Anthrenus scrophulariae). The tobacco beetle (Lasioderma serricorne) is controlled by pouring sodium fluosilicate solution into the furniture stuffing. Sodium fluosilicate scattered as a dry powder is recommended against roaches (Periplaneta americana, Blatta orientalis, and Blatella germanica), book lice (Atropos sp.), and silverfish (Lepisma saccharina). Barium fluosilicate has also given good results against cockroaches, sodium fluoride being less toxic.

(423) Mayné, R., and Bruel, W. van den.

1933. Rapport et récherches sur la mouche de la betterave (Pegomyia hyoscyami Panz.). Bull. Inst. Agron, Sta. Recherches Gembloux 2:273-307.

Treatment with sodium fluoride was successful in destroying the first-generation flies when weather conditions were favorable. Barium fluosilicate gave some good results, but its action was much slower. Laboratory tests showed that 0.4 percent of sodium fluoride or 0.2 to 0.3 of percent sodium fluosilicate was the best concertration of poison in the bait, with 2 percent of sugar. Artificial cryolite acted much too slowly and gave poor results. It was found best to spray in the middle of the day.

(424) Metzger, F. W.

1933. Preliminary report on controlling the winter emergence of the Japanese beetle in rose greenhouses by application of chemicals to the soil. Jour. Econ. Ent. 26:205-210.

Lead arsenate or barium fluosilicate used at the rate of 3,000 lb. per acre gave practically 100-percent control.

(425) Mitchener, A. V.

1933. The grasshopper campaign in Manitoba in 1932. Ontario Ent. Soc. Rept. 63:45-48.

In poison baits sodium fluosilicate gave an average kill of 78 percent. In limited work sodium fluoride gave over 90-percent kill. Calcium fluosilicate had little toxic effect.

(426) New York (Geneva) Agricultural Experiment Station.

1933. Cherry fruit fly. N. Y. (Geneva) Agr. Expt. Sta. Rept. 52:60.

Cryolite and related compounds and several arsenical substitutes for lead arsenate sprays effectively protected cherries against cherry fruit flies (Rhagoletis cingulata and R. fausta).

(427) Newcomer, E. J., and Carter, R. H.

1933. Studies of fluorine compounds for controlling the codling moth. U. S. Dept. Agr. Tech. Bull. 373, 24 pp.

The results of several years experiments with fluorine compounds as substitutes for lead arsenate are given. Under the arid conditions of the fruit-raising sections of the Pacific Northwest good control of the codling moth was obtained with several fluorine compounds.

(428) Newcomer, E. J., Dean, F. P., and Rolfs, A. R.

1933. Efficient control of the codling moth. Wash. State Hort. Assoc. Proc. 28: 28-32.

Cryolite is very effective when used with an oil emulsion and may be substituted for lead arsenate in the late sprays at the rate of 3 lb. per 100 gal.

(429) Peet, C. H.

1933. Report of the scientific committee--insecticides. Soap 9(1):87-88.

A review of the past year's literature on synthetic insecticides, rotenone, pyrethrum, fluorides, and arsenicals.

(430) Pescott, R. T. M.

1933. Codling moth control experiments at Harcourt. Jour. Dept. Agr. Victoria 31:484-489.

Dutox, a proprietary product consisting mainly of barium fluosilicate, was not satisfactory as a followup for calyx sprays of lead arsenate.

(431) Pflug, H., König, J., Mengele, H., Moll, F., and Engels W.

1933. Zur Holzkonservierung mit Silicofluoriden. Ztshr. Angew. Chem. 45:697-699.

A discussion of König and Mengele's paper by the above title (339)

(432) Plank, H. K.

1933. Damage caused by bean worms and some important problems connected with their control. Calif. Dept. Agr. Monthly Bull. 22:366-378.

Barium fluosilicate and possibly cryolite are the only materials that can be used for the control of bean worms on beans with safety to the plants and to livestock fed on the bean straw.

(433) Pussard, R.

1933. Les parasites animaux et vegetaux de l'oeillet; leur traitement. Eclair. Agric. Hort. 13:494-500. [Abstract in Rev. Appl. Ent. (A)22:509. 1934.]

Insects attacking the roots of carnation include wireworms (Gryllotalpa gryllotalpa L?) and the larvae of Opatrum sabulosum L. and Vesperus strepens F. Use of barium fluosilicate instead of zinc phosphide in poison baits against Gryllotalpa is advocated in view of the high toxicity of the zinc phosphide to man. Against Tortriox pronubana Hbn. dusts containing barium fluosilicate and talc, are believed to be more satisfactory than arsenical sprays.

(434) Rekach, V. N.

1933. The problem of protecting cotton from pests and diseases in ZSFSR (transcaucasian republics) during the second five-year plan. Trud. Zakavk. Nauch. - issled. Khlopk. Inst. (Trans. Transcaucas. Cotton Sci. Res. Inst.) No. 43:373-428 [In Russian. Abstract in Rev. Appl. Ent. (A) 22:486. 1934.]

Dust of sodium fluosilicate gave 90-95 percent control of Platyedra (Gelechia) malvella Hbn.

(435) Richardson, C. H., and Thurber, G. A.

1933. Further studies on the relative toxicity of poisons for grasshopper baits. Jour. Econ. Ent. 26:494-499.

Adults of Melanoplus differentialis Thom. were fed determined quantities of a standard bran-molasses bait containing known concentrations of arsenious oxide, sodium fluoride, cuprous cyanide, zinc phosphide, sodium fluoaluminate, acid lead arsenate, or nicotine tannate. The estimated median lethal dose of the first three compounds is 0.11 mg. per gram of body weight; for zinc phosphide it is 0.52 mg. Acid lead arsenate is much less toxic, the M. L. D. being approximately between 2 and 4 mg. Sodium fluoaluminate is less toxic than acid lead arsenate, Nicotine tannate has a low but undetermined toxicity. Cuprous cyanide and zinc phosphide seem worthy of further investigation.

(436) Roark, R. C.

1933. A second index of patented mothproofing materials. U. S. Dept. of Agr., Bur. Chem. and Soils Mimeo. Pub., 109 pp.

Some fluorine compounds are listed.

(437) Shepard, H. H., and Carter, R. H.

1933. The relative toxicity of some fluorine compounds as stomach insecticides. (Sci. Note) Jour. Econ. Ent. 26:913.

Fluorine compounds were tested for toxicity to the fourth-instar silkworm by the leaf sandwich method. Solubility of the compounds in water at 25° C. is also included. The compounds and their median lethal doses in milligrams per gram of body weight were as follows: Sodium fluoride 0.11-0.15; manganese fluoride 0.20-0.40; lead fluoride 0.25-0.40; magnesium fluoride 0.57; sodium fluosilicate 0.10-0.13; potassium fluosilicate 0.07-0.10; barium fluosilicate 0.09-0.12; sodium fluoaluminate 0.05-0.07; potassium fluoaluminate 0.08-0.10; ammonium fluoaluminate 0.11-0.14. The fluoaluminates of zinc, barium, magnesium, and calcium were less toxic than those listed above, toxicity decreasing in the order given.

(438) Shuey, G. A.

1933. Report on [the determination of] fluorine compounds [on foliage and fruits]. Jour. Assoc. Off. Agr. Chem. 16:153-155.

Study of the application of the Willard-Winter method to the determination of fluorine spray residues on foliage or fruit showed that the method is accurat e for the direct titration of pure fluoride solutions. Fluorine is quantitatively recovered by distillation from pure fluoride solutions, but only about 90 percent of the fluorine added before ashing is recovered from plant ash, possibly because of loss of fluorine during ignition. There is a progressive accumulation of fluorine on foliage with each successive application of fluorine spray.

(439) Squire, F. A.

1933. Rice in British Guinea 1927-1932. III. Insect pests of rice and padi. Brit. Guinea Dept. Agr., Rice Bull. 1:51-57.

Addition of 1/4 lb. of sodium fluosilicate per bag gave good control of the rice weevil (Calandra oryzae L.) in stored rice.

(440) Stanley, W. W.

1933. Outbreak of grasshoppers in Tennessee during 1932. (Sci.Note) Jour. Econ. Ent. 26:300-301.

Against grasshoppers (Schistocerca americana Drury and Melanoplus femur-rubrum DeG.) baits containing sodium fluosilicate were much more effective than those containing paris green.

(441) Suire, J.

1933. Remarques sur la courtilière. Prog. Agr. et Vitic. 100:19-22.

Poison bait containing barium fluosilicate is recommended for the control of Gryllotalpa gryllotalpa L.

(442) Tennessee Agricultural Experiment Station.

1933. Grasshoppers. Tenn. Agr. Expt. Sta. Ann. Rept. 45:33

The most effective field bait consisted of 100 lb. bran, 4 lb. sodium fluosilicate, 2 gal. molasses, and 3 oz. amyl acetate. The bait was less toxic to higher animals than paris green baits.

(443) Thomsen, M., and Wichmand, H.

1933. Ueber die Giftrindenmethode und andere Bekämpfungs-massnahmen gegen Hylobius abietis. Ztschr. Pflanzenkrank. 43:145-167.

Of the poisons tested in the laboratory, sodium fluosilicate was too slow, and sodium fluoride acted quickly but was unsuitable for dusting.

(444) Thompson, R. W.

1933. Sodium fluoride as a control for cattle lice. Ent. Soc. Ontario Ann. Rept. 63:54-56.

When applied in powdered form, sodium fluosilicate, sodium fluoride, calcium fluosilicate, and barium fluosilicate were equally effective in controlling cattle lice (Trichodectes scalaris, Haematopinus eurysternus, and H. vituli). Sodium fluoride killed biting lice more quickly than did derris. Sprays containing sodium fluoride were very effective.

(445) Thompson, T. G., and Taylor, H. J.

1933. Determination and occurrence of fluorides in sea water. Indus. and Engin. Chem., Analyt. Ed. 5:87-89.

Fluorides in sea water are titrated by the zirconium nitrate-alizarin procedure. To offset the interference of chlorides and sulfates, comparison standards containing the same amounts of chlorides and sulfates are used.

(446) Tziopkalo, (V.).

1933. On the question of the chemical method of control of the pine noctuid (Panolis flammea Schiff.). Sotzial. lesn. Khoz. Agrolesomel. [Social. For. & Agrosilvimelior.] No. 3, pp. 64-67. In Russian. Abstract in Rev. Appl. Ent. (A) 22:55. 1934.]

In laboratory tests sodium fluosilicate, sodium fluoride, and barium fluosilicate, applied as dusts, were less effective than calcium arsenite. In tests of the effect of the dusts on foliage, 37.1 percent of the pine needles were scorched by sodium fluosilicate, 38.3 percent by calcium arsenite, and 62.5 percent by sodium arsenite.

(447) White, W. B.

1933. Poisonous spray residues on vegetables. Indus. and Engin. Chem. 25:621-623.

Determination of excessive spray residues on fruits and vegetables is one of the important problems of the U. S. Food and Drug Administration. Analytical methods for fluorine and lead are reviewed.

(447a) Wichmann, H. J., and Dahle, Dan.

1933. Determinations of small quantities of fluorine. I and II. Jour. Assoc. Off. Agr. Chem. 16:612-624.

Modification of the Steiger-Mervin colorimetric method to include optimum pH at which fluorine will bleach peroxidized titanium. Principles governing sensitivity were definitely linked with concentration of titanium and fluorine, so that fluorine determinations might be made flexible enough to meet great variation in fluorine content and available apparatus. Interference of phosphates, aluminum, sulfates, and apple "wash" was quantitatively expressed, suggesting formation of unknown complexes. The procedure is described.

(448) Willard, H. H., and Winter, O. B.

1933. Volumetric method for the determination of fluorine. Indus. and Engin. Chem., Analyt. Ed. 5:7-10.

Titration of fluorine and silicofluoride with thorium nitrate with zirconium-alizarin indicator is described, and this method of analysis is applied to the determination of fluorine in minerals and plant ash.

(449) Williams, C. B.

1933. Observations on the desert locust in East Africa from July, 1928 to April, 1929. Ann. Appl. Biol. 20:465-497.

A few small-scale experiments with poisoned bran baits showed sodium arsenate and sodium fluosilicate to be equally effective against the locust Schistocerca gregaria Forsk. in Kenya.

(450) Wilson, L. B.

1933. Effects of chlorine, bromine, and fluorine on the tobacco plant. Jour. Agr. Research 46:889-899.

The accumulation of excessive amounts of chlorine, bromine, or fluorine in the soil interferes with normal carbohydrate metabolism of the tobacco plant and causes the leaf to become thick and brittle. Curling of the margin of the leaf also occurs when these elements are added in the form of the ammonium salt but not when added as a salt of calcium, potassium, or sodium. Excessive amounts of chlorine have little effect in transforming free water to bound water within the leaves of the plant, but the action of sodium fluoride in this respect is so marked as to indicate that this compound induces a state of physiological drought.

(451) Winter, O. B., and Butler, L.

1933. Résumé of a method for the determination of fluorine. Jour. Assoc. Off. Agr. Chem. 16:105-107.

Attempts to determine fluorine content of plant materials are discussed.

(452) Anonymous.

1934. Plantsygdomme i Danmark 1934. Tidsskr. Planteavl. 40:713-772, Overs St. Plantepat Forsg. 51. 1935. [Abstract in Rev. Appl. Ent. 24:55. 1936.]

Cutworms were unusually numerous and destructive on field and garden crops, but were efficiently controlled by bran baits poisoned with cryolite.

(453) Anderson, L. D., and Walker, H. G.

1934. The life history and control of the potato flea beetle, Epitrix cucumeris Harris, on the eastern shore of Virginia. Jour. Econ. Ent. 27:102-106.

Barium fluosilicate and sodium aluminum fluoride (synthetic cryolite) scorched the plants, especially when applied during wet weather, and did not give such good control as lead arsenate and lime.

(454) Australia Advisory Council for Scientific and Industrial Research.

1934. The sheep blowfly pest. Aust. Advisory Council Sci. and Indus. Research Rept. 8:17-19.

Experiments on the poisoning of carcasses of sheep to prevent the development of blowfly maggots indicated that sodium fluoride diluted with 2-4 parts of an inert dust is almost completely effective when applied to the shorn carcass but is somewhat less so when the wool is long.

(455) Bishop, H. J.

1934. Poison bait for cucurbit-flies. Farming in So. Africa. 9:338

During the summer of 1933-34 a bait spray of 1 oz. sodium fluosilicate, 2 lb. white sugar, and 4 gal. water proved much more effective than the customary spray of lead arsenate, sugar, and water.

(456) Bourne, A. I.

1934. Investigation of materials which promise value in insect control. Mass. Agr. Expt. Sta. Ann. Rept. 1933 (Bull. 305):28-30.

Dutox, a commercial barium fluosilicate compound, used as a dust with 2 or 3 parts of hydrated lime was as effective as magnesium arsenate against the Mexican bean beetle. It did not injure the bean plants and seemed to retard infestation.

(457) Brannon, L. W.

1934. A note on barium fluosilicate injury to dahlia flowers and the results of a test to determine the toxicity of this material to blister beetles. (Sci.Note) Jour. Econ. Ent. 27:1103.

A light application of a dust of 80 percent barium fluosilicate and wheat flour caused severe scorching of dahlias.

(458) Brioux, C., and Jouis, E.

1934. Action des éléments accessoires sur la végétation. Compt. Rend. Acad. Agr. France 20:257-264.

Calcium fluoride in small amounts (10 kg. per hectare) had a stimulating effect on the yield of potatoes.

(459) Carter, R. H.

1934. Solvents for cryolite. (Sci. Note) Jour. Econ. Ent. 27:863.

The solubility of cryolite was studied in an attempt to find better solvents for cryolite residue removal. Solubility of cryolite in dilute hydrochloric acid was decreased by the addition of small amounts of sodium chloride, and solubility in water was decreased by sodium chloride, sodium bicarbonate, and monosodium phosphate. Solubility of cryolite in water was increased by addition of aluminum salts such as sulfate and chloride and also by ferric salts. Solubility in dilute hydrochloric acid was increased by addition of boric acid, aluminum salts, and ferric salts.

(460) Chapman, P. J., and Hammer, O. H.

1934. A study of apple maggot control measures. N. Y. State Agr. Expt. Sta. (Geneva) Bull. 644, 40 pp.

Synthetic and natural cryolite and manganese arsenate have given promising results, though they are inferior to lead arsenate.

(461) Cowan, F. T.

1934. Grasshopper-bait tests in Colorado. Colo. Agr. Expt. Sta. Tech. Bull. 7, 18 pp.

Paris green was more toxic than sodium fluosilicate and sodium arsenite. Both paris green and sodium fluosilicate are much higher in price than sodium arsenite, a fact which almost excludes their use in large campaigns.

(462) Cutright, C. R.

1934. Codling moth. Ohio Agr. Expt. Sta. Bull. 532:45-46.

Against codling moth (Carpocapsa pomonella L.) cryolite was the most effective of the nonarsenical substitutes used.

(463) DeEds, F., and Thomas, J. O.

1934. Comparative chronic toxicities of fluorine compounds. Soc. Expt. Biol. and Med. Proc. 31:824-825.

The minimum dose capable of producing chronic intoxication in the rat has been determined for sodium fluoride, sodium fluosilicate, barium fluosilicate, and sodium aluminum fluoride (natural cryolite). In these compounds fluorine is capable of producing chronic intoxication, as indicated by bleaching of rat incisors in concentrations as low as 14 to 16 parts per million regardless of the solubility of the compounds. Depending on the amount of food consumed, this means that 0.5 to 1 mg. fluorine per day per kilogram of body weight is capable of producing definite signs of injury to the rat incisors. An intake of 1 to 2 mg. of fluorine per day is toxic to a child; human beings therefore appear to be more susceptible to fluorine poisoning than rats.

(464) DeLong, D. M.

1934. The present status of cryolite as an insecticide. Ohio Jour. Sci. 34:175-200.

Synthetic cryolite was better than natural cryolite. Good control was obtained of the bagworm (Thyridopteryx ephemeraeformis), the fall webworm (Hyphantria cunea), and the white marked tussock moth (Hemerocampa leucostigma S.) on shade trees without injury to the foliage. Discussion of relative toxicities in relation to tolerance is given.

(465) Dietz, H. F., and Zeisert, E. E.

1934. Barium fluosilicate (Dutox) in blister beetle control. Jour. Econ. Ent. 27:73-78.

Laboratory tests with more than 5,000 insects showed that barium fluosilicate (Dutox) with flour, talc, or clay (1:4) killed a uniformly high percentage of beetles. Lime reduced efficiency. In field tests in dry weather barium fluosilicate with flour or lime at rate of 25 to 35 lb. per acre gave good control of Epicauta marginata LeC. and E. pennsylvanica Deg. on potatoes and other vegetable crops, without injury to plants.

(466) Dimick, R. E., and Mote, D. C.

1934. The present status of the European earwig. Calif. Dept. Agr. Monthly Bull. 23:298-300.

Good results in control of the European earwig have been reported with a bait of 12 lb. bran, 1 lb. sodium fluosilicate, and 1 qt. fish oil; and also one of 2 gal. water, 1 lb. sodium fluoride, 2 qt. molasses, and 12 lb. bran.

(467) Douglass, J. R.

1934. Habits, life history, and control of the Mexican bean beetle in New Mexico. U. S. Dept. Agr. Tech. Bull. 376, 46 pp.

Sodium fluosilicate was not very effective in the control of the Mexican bean beetle.

(468) Dubois, R.

1934. Le miel de pays comme succédané de la melasse dans la preparation des appats empoisonnés utilisés dans la lutte antiacridienne au Soudan Français. Rev. Path. Vég. et Ent. Agr. 21:36-40.

Experiments were conducted against Schistocerca gregaria Forsk. and Locusta migratoria migratorioides R. and F. with poison baits in which honey was substituted for molasses. When honey was used, the amount of sodium fluosilicate could be reduced from 8 to 7 lb.

(469) Electro Chemical Processes, Ltd.

1934. Perfectionnements aux suspensions colloidales utilisables comme insecticides. French patent 758,010; issued January 9; appl. July 4, 1933.

An aqueous colloidal suspension of an insoluble silicofluoride (barium fluosilicate) or cryolite is precipitated by heating a mixture of barium fluosilicate or cryolite in an aqueous liquid with a protective colloid, and in the case of barium fluosilicate with a small amount of a barium salt of an acid weaker than fluosilicic acid (5 percent barium carbonate) until a thick aqueous paste is obtained. A small amount of 0.2 percent sodium caseinate may be added.

(470) Elmore, J. C., Davis, A. C., and Campbell, R. E.

1934. The pepper weevil. U. S. Dept. Agr. Tech. Bull. 447, 27 pp.

Against Anthonomus eugenii Cano fluorine dusts, including cryolite, potassium fluoaluminate, and barium fluosilicate, were more toxic than calcium arsenate, but they all injured the plants and reduced the yield of peppers.

(471) Feytaud, J.

1934. Les appâts toxiques contre les vers gris. Rev. Zool. Agr. et Appl. 33:161-167.

Poison baits were used for controlling cutworms attacking tobacco. Barium fluosilicate was effective.

(472) Garman, P.

1934. Orchard experiments with substitutes for lead arsenate. Conn. Agr. Expt. Sta. Bull. 360:451-458.

Synthetic cryolite (4 lb. per 100 gal.) gave promising results against curculio and codling moth and when combined with lime and flotation sulfur did not cause burning. The residue at harvest was below the tolerance of 0.01 grain F per pound when the last spray was applied on July 28. Peach trees were not injured by applications of 4 lb. of barium fluosilicate, 4 lb. of wettable sulfur, and 4 lb. of lime in 100 gal. of water.

(473) Haines, G. C.

1934. The small house ant. Farming in So. Africa. 9:415.

The best insecticide for general use is sodium fluoride powder, which should be spread thinly wherever ants abound, especially at cracks or corners from which they are likely to emerge.

(474) Harman, S. W.

1934. Codling moth control experiments during 1933. Jour. Econ. Ent. 27:222-225.

Cryolite, natural and synthetic, was not so effective as lead arsenate in control of codling moth Carpocapsa pomonella in apple orchards of western New York.

(475) Hart, E. B., Phillips, P. H., and Bohstedt, G.

1934. Relation of soil fertilization with superphosphates and rock phosphate to fluorine content of plants and drainage waters. Amer. Jour. Publ. Health 24:936-940.

Drainage water from a single series of lysimeters in Chickamauga soil at Knoxville, Tenn., showed a particularly high fluorine content where the soil had been treated with rock phosphate and a definitely increased fluorine content as compared with the control where treated with superphosphate. The results raise the important question as to the ultimate influence of our present system of fertilization with rock phosphate or superphosphate as now manufactured upon the fluorine content of drinking waters and their relation to public health.

(476) Hauck, H. M.

1934. The effect of fluorine feeding on the storage of vitamin C in the rat and guinea pig. Jour. Agr. Research 49:1041-1046.

No difference was observed in the vitamin-C content of livers and adrenals of fluorine-fed and control rats. In both cases adrenals of rats that were tested for vitamin C by the silver nitrate staining test reduced silver nitrate rapidly. Feeding chlorine for 3 to 5 weeks did not prevent storage of vitamin C in the adrenals and livers of guinea pigs. If fluorine feeding interferes with the action of vitamin C in the organism such interference probably occurs elsewhere in the metabolism than in storage of the vitamin.

(477) Hey, G. L., and Steer, W.

1934. Experiments on the control of the apple sawfly (Hoplocampa testudinea Klug.) The results of one season's field trials and some considerations arising from this. East Malling Research Sta. Ann. Rept. 21:197-216.

Barium fluosilicate did not give more than 20 to 30 percent control.

(478) Hill, S. B., Jr., Yothers, W. W., and Miller R. L.

1934. Effect of arsenical and copper insecticides on the natural control of whiteflies and scale insects by fungi on orange trees in Florida. Fla. Ent. 18:1-4.

Lead arsenate, cryolite, and potassium fluoaluminate allowed aleurodids to increase and had no measurable effect on the amount of scale fungus or on the live scale population.

(479) Hough, W. S.

1934. Codling moth control. Va. Fruit 23:165-170.

Combinations of sodium cryolite and fish oil give results almost equal to those obtained with lead arsenate, but it would be necessary to wash the fruit to reduce the fluorine residue to 0.01 grain per pound if cryolite were used in July.

(480) Hough, W. S.

1934. Colorado and Virginia strains of codling moth in relation to their ability to enter sprayed and unsprayed apples. Jour. Agr. Research 48:533-553.

Larvae from Colorado reared under Virginia climatic conditions since 1928 have consistently demonstrated a distinct superiority over larvae from Virginia in their ability to enter unsprayed apples as well as those sprayed with lead arsenate, cryolite, barium fluosilicate, rotenone, cuprous cyanide, or nicotine.

(481) Huber, L. L., Polivka, J. B., and Savage, J. R.

1934. Corn earworm. Ohio Agr. Expt. Sta. Ann. Rept. 52 (Bull. 532):43-44.

Against attacks of corn ear worm (Heliothis obsoleta Fab.) on corn. A mixture of Dutox (barium fluosilicate) and flour 1:4 gave about 50-percent control and was slightly injurious to the corn.

(482) Jancke, O.

1934. Über die Giftigkeit einiger im Planzenschultz gebräuchlicher Fluorverbindungen. Anz. Schädlingskunde 10:55-58, 68-71.

Review of data in the literature, and especially from Gautier and Clausmann (12,32,33) on the fluorine content of fruits and vegetables.

(483) Jay, E. A.

1934. Polystictus versicolor [wood-rotting fungus]. Roy. Bot. Gard. Kew, Bull. Misc. Inform. 1934(10):1-15. [Abstract in Analyst 60:267-268. 1935.]

The best methods of preventing decay are to creosote permanent erections and to dry felled wood as soon as possible before rot begins. A 4-percent solution of sodium fluoride is recommended where creosote cannot be used, but contact with water not only washes this out but also produces conditions favorable for growth of the fungus.

(484) Kearns, H. G. H.

1934. Insect pests of gardens in the Bristol district and how to control them. Bristol Nat. Soc. Proc. [4]7:542-548.

For control of the codling moth a wash containing colloidal sulfur and colloidal barium fluosilicate with soap or other wetting agents may be substituted for nicotine and lead arsenate.

(485) Lacroix, D. S.

1934. Tobacco insects in 1933. Conn. Agr. Expt. Sta. Bull. 359: 377-382.

A tobacco byproduct known as Richmond filter dust was a satisfactory carrier for barium fluosilicate against the potato flea beetle (Epitrix cucumeris Harr.).

(486) Lantz, E. M., and Smith, M. C.

1934. The effect of fluorine on calcium and phosphorus metabolism in albino rats. Amer. Jour. Physiol. 109:645-654.

Data are given on the calcium and phosphorus metabolism of rats fed with and without sodium fluoride. Growing rats fed a diet to which 0.1 percent of sodium fluoride was added retained much less calcium and less phosphorus than control animals fed the same ration without sodium fluoride.

(487) McGregor, E. A.

1934. Platynota stultana Wlsm. (Lepidoptera) damaging green oranges in southern California. Jour. Econ. Ent. 27:974-977.

A footnote states that promising results against the larvae of Platynota stultana were obtained by the application of two sprays and one dust containing cryolite and by one spray and one dust containing barium fluosilicate.

(488) McKee, R. H., and Johnston, W. S.

1934. Removal of fluorides from drinking water. Indus. and Engin. Chem. 26:849-851.

Presence of fluorine in drinking water to the extent of 5 to 17 parts per million is known to be the cause of mottled enamel in teeth. Absorption by carbon removes fluorides from potable waters, but some carbons are much less efficient than others. The pH value is of importance. Attempts to reduce fluorine to less than 1 part per million have been unsuccessful.

(489) Machle, W., Thamann, F., Kitzmiller, K., and Cholak, J.

1934. The effects of the inhalation of hydrogen fluoride. I. The response following exposure to high concentrations. Jour. Indus. Hyg. 16:129-145.

Exposure to concentrations of hydrogen fluoride above 1.5 mg. per liter for any period of time is dangerous for rabbits and guinea pigs. Exposure of these animals to a concentration of 1.0 mg. per liter for 30 minutes caused no deaths, and 0.1 mg. per liter was tolerated for as long as 5 hours. The toxicity of hydrogen fluoride appears to be of the same order as that of hydrochloric acid.

(490) Marcovitch, S.

1934. Control of weevils in stored beans and cowpeas. Tenn. Agr. Expt. Sta. Bull. 150, 8 pp.

Damage to beans by the bean weevil (Mylabris obtectus) and the cowpea weevil (M. quadrimaculatus) was prevented by use of sodium fluoride or fluosilicate or barium fluosilicate (1:1000). Sodium fluosilicate (1:1500) was satisfactory against the grain weevil (Sitophilus granaria) and apparently against the angoumois grain moth (Sitotroga cerealella) in grain.

(491) Nash, R. W.

1934. The willow flea weevil, Orchestes rufipes Lec., and its control in Maine. Jour. Econ. Ent. 27:336-339.

Tests with lead arsenate sprays and dusts of sodium fluosilicate and hydrated lime showed these insecticides to be of no value.

(492) Nesmejanov, A. N., and Kahn, E. J.

1934. Über die unmittelbare Synthese von Säure-fluoriden aus Säuren und die Herstellung von Formylfluorid. Ber. Deut. Chem. Gesell. 67(B):370-373.

Formyl fluoride is about three times as toxic to insects as chloropicrin and acetyl fluoride.

(493) Nevskiĭ, V. P.

1934. The mulberry geometrid (Apocheima cinerarius Ersch.) and its control. 80 pp. Moscow. [Amalgam. St. Pub. centr. Asiat. Sect.] [In Russian. Abstract in Rev. Appl. Ent. 22(A): 458-460. 1934.]

Measures for control include spraying poplars, elms, or apricots growing near the mulberries with sodium fluoride or sodium fluosilicate (7 lb. in 100 gal.).

(494) Newcomer, E. J.

1934. The status of codling moth control in the Pacific Northwest. Jour. Econ. Ent. 27:139-141.

Good results were obtained by using sodium fluoaluminate (cryolite) with fish oil, mineral oil, or soap for second-brood sprays, but fluorine residues were difficult to remove.

(495) Nonell Comos, J., and Bardia, R.

1934. El "cadell" o alacrán cebollero (Gryllotalpa gryllotalpa, L.). Barcelona, Estac. Fitopat. Agr., [Publ.], 23 pp. [Abstract in Rev. Appl. Ent. (A)23:160. 1935.]

Sodium fluosilicate in baits was very effective against mole crickets and not poisonous to poultry. Barium fluosilicate was equally as effective and even less poisonous to poultry.

(496) Nursery and Market Garden Industries Development Society, Ltd.

1934. Tomato-moth caterpillar. Nursery and Market Gard. Indus. Devl. Soc., Ltd., Research Expt. Sta. Rept. 19:71-72.

Addition of rape oil increased the adhesive properties of synthetic cryolite used as a late-season substitute for lead arsenate against Polia oleracea L. in tomato houses. The best formula consisted of 1/2 lb. of fine cryolite stirred into 4 oz. of water to which 2 oz. of rape oil was gradually added, the resulting paste being diluted at the rate of 2 oz. to 1 gal. of water. The foliage was not scorched, and each plant yielded over 1 lb. of good fruit during the month, less than 1 percent of which bore feeding marks.

(497) Parker, J. R., Shotwell, R. L., and Morton, F. A.

1934. The use of oil in grasshopper baits. Jour. Econ. Ent. 27:89-96.

In field tests with Melanoplus mexicanus Sauss and M. bivittatus Say baits of 4 lb. sodium fluosilicate to 100 lb. bran scattered at the rate of 10 lb. per acre were very effective.

(498) Permutit, A.-G.

1934. Bekämpfung von Rübenaaskäfern und ihren Larven. German patent 591,107; issued Jan. 16; appl. June 16, 1937.

Compositions for destroying carrion beetles and their larvae comprise an alimentary poison, e. g., Schweinfurts green, sodium fluosilicate, or an arsenate mixed with fish oil, meat meal, or dried blood, with or without a diluent or nutrient such as bran.

(499) Phillips, P. H., Hart, E. B., and Bohstedt, G. B.

1934. The influence of fluorine ingestion upon the nutritional qualities of milk. Jour. Biol. Chem. 105:123-134.

The content of fluorine in normal milk was 0.05 to 0.25 mg. per liter (average 0.138), while that from cows fed 0.2 to 3.0 g. of fluorine as rock phosphate per day was only slightly higher or the same. In rats with a fluorine intake of 0.132 mg. per day no toxicosis was observed. Fluorine in concentration of 1 part in 10,000,000 in the diet has no effect on rats.

(500) Phillips, P. H., and Lamb, A. R.

1934. Histology of certain organs and teeth in chronic toxicosis due to fluorine. Arch. Path. [Chicago] 17:169-176.

As a direct result of including fluorine (20-30 mg. per kg. per day) in the diet of rats, in the form of either sodium fluoride or rock phosphate, pathological changes have been noted in the kidneys, incisor teeth, and thyroid glands. To a lesser and more variable extent pathologic changes have been noted in the liver and suparenal glands. Pathological conditions in other tissues were not detected.

(501) Pussard, R.

1934. Note préliminaire sur les methodes de lutte contre le bupreste des arbres fruitiers Capnodis tenebrionis L. Compt. Rend. Acad. Agr. France. 20:1010-1019.

Laboratory experiments with insecticides other than arsenicals showed that barium fluosilicate dusts killed all the adults in 4 days when used alone or with 50 percent talc and in 5 or 6 days when mixed with 80 percent talc.

(502) Ripley, L. B., and Hepburn, G. A.

1934. Adhesives for cryolite suspensions. Union So. Africa Dept. Agr. Sci. Bull. 122, 12 pp.

Of the many adhesives studied for use with natural and synthetic cryolite, boiled linseed oil gives best results. Natural cryolite is superior to the synthetic material as regards adhesive value, giving much better adhesiveness with considerably less oil. Its suspendibility, however, although generally satisfactory, is not nearly so high as that of the synthetic product. Directions are given for making cryolite-oil suspensions of high adhesive value.

(503) Ripley, L. B., and Hepburn, G. A.

1934. Incompatability of molasses with sodium fluosilicate and lead arsenate. Union So. Africa Sci. Dept. Agr. Sci. Bull. 130, 2 pp.

In experiments treacle (7.6 percent) as compared with white sugar (6.25 percent) nullified the action of sodium fluosilicate (0.14 percent) and considerably reduced that of lead arsenate (0.14 percent). It is probable that this is due to the presence of lime, which in the treacle occurs mainly as calcium sucrate. White sugar should be substituted for treacle until the latter is proved not to be responsible for loss in toxicity.

(504) Ripley, L. B., and Petty, B. K.

1934. The wattle bagworm problem. Farming in So. Africa 9:96-99.

In controlling the wattle bag worm (Acanthopsyche junodi Heyl.) with dusts, natural cryolite has proved the best in toxicity, adhesiveness, and the nature of the dust cloud formed, besides being the cheapest.

(505) Ripley, L. B., and Petty, B. K.

1934. Further experiments on controlling wattle bagworm by dusting. Union So. Africa Dept. Agr. Sci. Bull. 131:3-17.

Mixtures of calcium arsenate or paris green with natural cryolite gave a degree of toxicity between those of the two ingredients, such mixtures proving of no advantage, but the incorporation of 7.3 percent parafin oil with the cryolite gave very promising results. Natural cryolite was slightly more toxic than the synthetic product in the laboratory, and much more effective in the field as it adhered better. Barium and sodium fluosilicates did not adhere well, and the dust cloud of the latter proved unsatisfactory. Sodium ferric fluoride was abandoned mainly owing to its high cost.

(506) Robertson, M. E., Marriott, R. H., and Humphreys, F. E.

1934. The use of sodium fluoride in salt for hide preservation. Jour. Soc. Chem. Indus. 53:83T-89T.

Data are presented showing effectiveness of 0.5 to 1.0 percent sodium fluoride or sodium fluosilicate in inhibiting red heat (growth of halophilic bacteria) in salted hides. The presence of calcium in salt lowers the effectiveness, probably because of formation of calcium fluoride. Analysis of gelatin made from hides so preserved showed no more than normal fluorine content (about 0.02 percent).

(507) Robinson, R. H.

1934. Latest developments in washing apples. Jour. Econ. Ent. 27:162-167.

When fluorine compounds were used in 2 to 3 cover sprays, either hydrochloric acid or sodium silicate cleaned the fruit effectively below the 0.01-grain tolerance, but when these compounds were used in combination with mineral or fish oil the residue was not removed satisfactorily by any treatment.

(508) Ryall, A. L.

1934. Fluorine spray residue removal. Wash. State Hort. Assoc. Proc. 30:86-87.

Some type of brushes in the washers is almost essential to satisfactory removal of fluorine. The most effective equipment known for this purpose is the double-process machine with underbrushes in each compartment. Hydrochloric acid is a more effective fluorine solvent than sodium silicate. Certain salts, such as ferric chloride and aluminum sulfate, show promise for increasing the solvent action of hydrochloric acid.

(509) Sakharov, N., Pilyugina, O., and Ginsburg, D.

1934. The weevils of the genus Sitona attacking leguminous plants and their control. Grain Prod. Jour. 4:75-83. [In Russian. Abstract in Rev. Appl. Ent. (A)23:76-77. 1935.]

Very good results were obtained in control of the weevils in field and laboratory tests with sodium fluosilicate and sodium fluoride, but sodium fluoride caused severe scorching of the leaves.

(510) Sanchis, J. M.

1934. Determination of fluorides in natural waters. Indus. and Engin. Chem., Analyt. Ed. 6:134-135.

Slight modification of the Thompson-Taylor procedure to make it adaptable to routine determinations.

(511) Smit, B.

1934. A study of the most important insect pests that confront the citrus grower in the eastern province. So. African Jour. Sci. 31:439-441. [Abstract in Rev. Appl. Ent.(A)23:142. 1935.]

Aphis tavaresi Del G. is common. A bait spray of sodium fluosilicate and sugar has proved effective in extensive trials and does not affect the flavor of the fruit.

(512) Smith, E., Ryall, A. L., Gross, C. R., Carter, R. H., Murray, C. W., and Fahey, J. E.

1934. The removal of lead, arsenic and fluorine residues from apples. Wash. State Hort. Assoc., Proc. 29:86-96.

The lead and fluorine residues on fruits sprayed for control of the first brood of codling moth with lead arsenate and against the second brood with two or three covers of cryolite plus fish oil or mineral-oil emulsion were in most cases satisfactorily cleaned to meet the tolerances where the better types of washing treatments were employed. The most efficient treatments were hydrochloric acid plus salt plus mineral oil in the brush-flood machine and sodium silicate followed by hydrochloric acid in the double-process machine.

(513) Smith, M. C.

1934. Effects of fluorine upon rate of eruption of rat incisors, and its correlation with bone development and body growth. Jour. Dental Research 14:139-144.

The presence of 0.05 to 0.10 percent sodium fluoride in the ration of albino rats decreased the rate of eruption of the lower incisor teeth, the rate of body growth, and the retention of calcium and phosphorus.

(514) Smith, M. C., and Leverton, R. M.

1934. Comparative toxicity of fluorine compounds. Indus. and Engin. Chem. 26:791-797.

The compounds studied were sodium, potassium, ammonium, and calcium fluorides, sodium, potassium, and barium fluosilicates, and natural cryolite. From the standpoint of initital damage to the teeth all these compounds were equally toxic. Fourteen parts of fluorine per million from any source in the diet of the rat leaves a mark on the rat's incisors.

(515) Smith, O. M., and Dutcher, H. A.

1934. Colorimetric determination of fluorine. Indus. and Engin. Chem., Analyt. Ed. 6:61-62.

Determination of fluorine in natural water by the formation of a color lake using a zirconium-quinalizarin mixture is described. Aluminum, ferric, sulfate, and phosphate ions may be disturbing factors. They are effective, however, only above certain limits and can be removed.

(516) Steiner, L. F., Sazama, R. F., and Fahey, J. E.

1934. Insecticide tests to control the codling moth at the Vincennes, Indiana, laboratory during 1934. Ind. Hort. Soc. Trans. 74:66-71.

Natural and synthetic cryolite gave as good results as lead arsenate, but caused some reduction in size of fruit and left a residue load that could not be removed by ordinary washing procedures.

(517) Tananaev, I. V., and Savchenko, G. S.

1934. [Fractional detection and determination of fluorine.] Jour. Appl. Chem. (U.S.S.R.) 7:229-231. [Abstract in Chem. Abs. 29:1741. 1935.]

Five milliliters of solution is made alkaline to phenolphthalein with aqueous sodium hydroxide and an excess of aqueous silver nitrate is added. The solution is warmed and filtered and aqueous calcium nitrate added. The solution becomes turbid if more than 0.4 mg. of fluorine is present. Fluorine is determined by titrating the neutral solution with standard aluminum chloride (phenolphthalein).

(518) Thompson, W. L.

1934. Nonarsenical stomach poisons for grasshopper control. Fla. Ent. 18:5-10.

The best results were obtained with 1 lb. of sodium fluoride to 20 lb. of bran with 2 qt. of syrup, and with 3 lb. of sodium fluosilicate to 50 lb. of bran with 1 gal. of syrup and about 10 grapefruit.

(519) Tucker, R. W. E.

1934. Insects in houses in Barbados. Jour. Barbados Mus. Hist. Soc. 1:73-79. [Abstract in Rev. Appl. Ent. (A)22:450. 1934.]

Cockroaches are best controlled with sodium fluoride. Crickets (Amphiacusta caribbea Sauss.) can also be controlled with sodium fluoride dust.

(520) Turner, N.

1934. Control of the potato flea beetle, Epitrix cucumeris Harris. Conn. Agr. Expt. Sta. Bull. 360:445-446.

A dust composed of barium fluosilicate (1 lb.) and lime (5 lb.) was highly effective in laboratory tests, but in field tests a 1:3 dust was inferior to bordeaux mixture when judged by the yield of potatoes. Barium fluosilicate spray was ineffective.

(521) Urquijo, L. P.

1934. Disinfeccion de semillas. Estac. Fitopat. Agr. Galicia Pub. 19 pp., 6.

Uninfested seeds should be stored in bags dusted with a mixture of 1 part barium fluosilicate to 3 parts slaked lime.

(522) Webster, R. L.

1934. The status of codling moth control with insecticides. N. Y. State Hort. Soc. Proc. 79:33-46.

Three years experiments indicate the value of substitutes for lead arsenate to be in the following descending order: Nicotine-oil combinations, fluorine compounds (especially cryolite), magnesium arsenate, and calcium arsenate. Not more than two applications of cryolite should be made because of the residue left on the fruit. Apples sprayed with cryolite after lead arsenate showed some burn when washed with acid.

(523) Wheeler, H. W.

1934. Thrips investigation. 3. Some observations on the loss of toxicity of certain dusts used in experiments on the control of the apple trips (T. imaginis Bagnall). Jour. Coun. Sci. Indus. Research 7:70-72.

The rotenone content of a fresh sample of a commercial dust containing crushed derris root, barium fluosilicate, and sulfur was 1.5 percent, as compared with 0.9 percent for a sample that had been exposed in a thin layer to sunlight for 25 hours.

(524) Whitcomb, W. D.

1934. Plum curculio. Mass. Agr. Expt. Sta. Bull. 305:34.

Barium fluosilicate and sodium aluminum fluoride were only slightly less effective than lead arsenate in combating the adult plum curculio.

(525) White, W. B.

1934. The current seasons experiences in enforcing spray residue tolerances. Jour. Econ. Ent. 27:125-133.

Residues of fluorine compounds are more difficult to remove from apples than residues of lead arsenate.

(526) Wilbur, D. A., and Bryson, H. R.

1934. Testing of various sprays and dusts as insecticides or repellents against the corn earworm on corn. Kans. Agr. Expt. Sta. Rept. 1932-34:103-104.

Lead arsenate dusts were most effective in reducing corn ear worm on both sweet or field corn. Commercial sodium fluosilicate severely burned the husks and silks, rendering the ears unsalable.

(527) Wilson, H. F.

1934. Will fluorine compounds be accepted as insecticides? (Sci. Note) Jour. Econ. Ent. 27:291.

Feeding experiments with rats, chickens, pigs, and cattle with rock phosphate show that fluorine is dangerous in amounts near the tolerance now allowed for its use as an insecticide.

(528) Woglum, R. S., LaFollette, J. R., Landon, W. E., and Lewis, H. C.

1934. Handbook of citrus insect control for 1934. Calif. Fruit Gr. Exch. Bull. 11, 29 pp.

Tortrix citrana Forn. and Holcocera iceryaella Riley were controlled by a spray of 3 lb. cryolite, 1 pt. mineral oil, and 1/3 pt. liquid albumin in 100 gal. water or a dust of cryolite, talc, and mineral oil (10:9:1).

(529) Wolfenbarger, D. O.

1934. Some effects on potato flea beetle (Epitrix cucumeris Harris) injuries and yields by spraying. Jour. Econ. Ent. 27:118-120.

A spray of 2 lb. of barium fluosilicate to 50 gal. of 5-7-50 bordeaux mixture did not give so good a yield of potatoes as a similar lead arsenate-bordeaux spray.

(530) Allman, S. L.

1935. The codling moth problem. Agr. Gaz. N. S. Wales 46:459-463.

Of the nonarsenicals tested, nicotine sulfate plus white oil was the most effective, but it was decidedly inferior to lead arsenate. Poorer results were obtained with cryolite sprays.

(531) Bartholomew, R. P.

1935. Fluorine, its effect on plant growth and its relation to the availability to plants of phosphorus in phosphate rocks. Soil Sci. 40:203-217.

To learn the effect of soluble fluorine compounds on seed germination, plant growth, and phosphate availability, solution cultures, potassium tests, etc., were made at the Arkansas Agricultural Experiment Station with Sudan grass, cow peas, soybeans, red clover, and white Dutch clover as test plants. Fluorine in the plants was found largely in the roots and was present in the tops only when the amounts in the roots were relatively large. The phosphate percentage in the tops tended to decrease as the percentage of fluorine in the roots increased.

(532) Basinger, A. J., and Boyce, A. M.

1935. Progress report on orange worm control. Calif. Citrogr. 20:158, 178-179.

The orange worm (Argyrotaenia (Tortrix) citrana Fern.) was controlled by dusting the trees in June-August with a mixture of barium, sodium, or potassium fluosilicate 50, fiber talc 45, and refined mineral oil (70 viscosity) 5 percent at the rate of 1 lb. per tree. Effective results were also obtained by spraying with 3 lb. of sodium aluminum fluoride per 100 gal. plus 0.5 pt. of liquid blood-albumin adhesive spreader. Simultaneous control of orange worm and black scale was obtained by adding sodium aluminum fluoride, 1.5 to 3.0 lb. per 100 gal., to either "soluble oil" paste emulsion or tank-mixed oil-emulsion sprays. Sodium aluminum fluoride is compatible with many of the common oil sprays.

(533) Bigger, J. H.

1935. Preliminary field tests of oil bait for cutworm control. Jour. Econ. Ent. 28:130.

A bait of bran and lubricating oil mixed with sodium fluosilicate controlled lepidopterous larvae in field tests in Ohio. Species controlled were armyworm (Cirphis unipuncta Haw.), fall armyworm (Laphygma frugiperda S. and A.), yellow-striped armyworm (Prodenia ornithogalli Guen.), corn ear worm (Heliothis obsoleta Fab.), alfalfa caterpillar (Eurymus eurytheme Bdv.), and alfalfa looper (Autographa californica Speyer).

(534) Bleeck, J.

1935. Perfectionnements aux produits pour la conservation de substances animales et vegetales. French patent 785,524; issued Aug. 12; appl. Feb. 12, 1935.

An aqueous solution of sodium sulfate and sodium fluoride containing a suspension of kaolin is used. Sodium fluosilicate may also be used. An example contains, in water, sodium sulfate 80 to 85 percent, sodium fluoride 2 to 5 percent, sodium fluosilicate 0.25 to 2.0 percent, and kaolin 12 to 17 percent.

(535) Elijdorp, P. A.

1935. Voorloopige mededeeling over de resultaten der proefnemingen met chemische middelen ter bestrijding der kariwjmot (Depressaria nervosa Hw.) in 1934. Verslag. en Meded. Plantenziektenkund. Dienst. Wageningen 78, 18 pp.

Experiments with insecticides against caraway moth on caraway in Holland included mineral oils and dusts of arsenicals, sodium and barium fluosilicates, and derris. Derris proved superior to fluosilicates, which were superior to the others.

(536) Bobb, M. L.

1935. Experiments on the control of the Mexican bean beetle, 1933-1934: Va. Agr. Expt. Sta. Bull. 296, 11 pp.

Little or no injury to the plants and a high degree of protection against the beetles were given by calcium fluosilicate 15 percent as a dust with fuller's earth 1:2, Dutox (80 percent barium fluosilicate) as an undiluted dust or as a spray 1-1/2 lb. to 50 gal., and Flusul (75 percent barium fluosilicate) as a spray 2 lb. to 50 gal.

(537) Borden, A. D.

1935. The willow weevil as a deciduous fruit insect pest. Jour. Econ. Ent. 28:661-665.

Dusting infested trunks of apple trees below the bands of tree Tanglefoot with sodium fluosilicate failed to kill the willow weevils.

(538) Borden, A. D.

1935. Codling moth control and spray residue studies in California. Jour. Econ. Ent. 28:951-956.

No substitute has been found for standard lead arsenate, especially in the first two sprays. Natural cryolite, synthetic cryolite, manganese arsenate, calcium arsenate, oil-nicotine, and nicotine bentonite, when used throughout the season, failed to give satisfactory control, although some of them showed promise when used in late cover sprays following lead arsenate in the first two applications.

(539) Boyce, A. M.

1935. The codling moth in Persian walnuts. Jour. Econ. Ent. 28:864-873.

The average percentages of infested walnuts after one thorough, properly timed application of each material were: Dutox (barium fluosilicate 80 percent), 17 percent; cryolite, natural, 13 percent; cryolite, synthetic, 9 percent; basic lead arsenate, 6 percent. These and other data show that neither of the fluorine compounds tested was so effective as basic lead arsenate in the control of codling moth on walnut.

(540) British Guiana Department of Agriculture.

1935. Rice. Brit. Guiana Dept. Sci. and Agr. Div. Rept. 1934:122.
In experiments to protect stored rice from the rice weevil, both calcium carbonate at the rate of 1 lb. of per 130 lb. of rice and sodium fluosilicate at the rate of 0.07 percent by weight were effective for at least 8 months.

(541) Broudy, H.

1935. Control experiments against Fuller's rose beetle (Asynonychus godmani Crotch) on roses in commercial greenhouses. (Sci. Note) Jour. Econ. Ent. 28:248-249.
A commercial barium fluosilicate applied as a dust apparently killed all the beetles and did not scorch the plants.

(542) Bryan, J., and Richardson, N. A.

1935. Experiments on the preservation of mine timber--progress report No. 1. [Gt. Brit.] Dept. Sci. and Indus. Research. Forest Prod. Research Rec. 3, 10 pp.
After 5 years' exposure of timbers treated with various preservatives in colliery pits in England and Scotland, the following results are reported: Untreated controls are practically all destroyed by fungi; creosote, Wolman salts, and sodium fluoride are showing best protection. The lower concentrations of Wolman salts and sodium fluoride (2 percent) are sufficient for satisfactory protection. Wolman salts is a patented preservative consisting of approximately 80 percent sodium fluoride, 6 percent dinitrophenol, 5 percent sodium dinitrophenate, and 9 percent potassium dichromate.

(543) Burgess, R.

1935. Experiments on the preservation of wool against harmful insects. Jour. Soc. Dy. Col. 51:85-89.
In tests with Tineola biselliella temporary protection was afforded by the commercial application of sodium fluosilicate.

(544) Carter, R. H.

1935. An investigation of solvents for the removal of insecticidal fluorine residues from fruits. Jour. Econ. Ent. 28:829-831.
Some compounds, notably sodium salts, when added to water and to aqueous solutions of mineral acids, decrease the solubility of cryolite, whereas some other compounds, such as boric acid and aluminum and ferric salts, increase its solubility.

(545) Casares, J., and Salinas, T.

1935. Sobre la determinación cuantitative del fluor y su aplicación a algunos productos naturales. Madrid Acad. Cienc. Rev. 32:88-91.

Ordinary glass serves well for the formation of silicofluoride. The Fresenius method gave excellent results. The Offerman method was satisfactory when modified. The Boer colorimetric method was adopted for microdetermination. A large number of fluorine determinations on natural products are reported.

(546) Cottier, W.

1935. Experiments on the control of the bronze beetle (Eucolaspis brunnea). New Zeal. Jour. Sci. and Technol. 17:433-453.

Paris green, Dutox (barium fluosilicate), and sodium arsenite were the only poisons that proved comparable, weight for weight, with acid lead arsenate.

(547) Delassus

1935. French West Africa. Locust control in Senegal in 1934. Intern. Bull. Plant Protection 9:149-150.

The use of fluosilicates or arsenicals for control of Locusta migratoria migratorioides was uncertain, for the forests were sufficiently dense to prevent the locusts from taking the baits laid down for them.

(548) Diamond, V. R.

1935. Barium fluosilicate as a control for cabbage worms (Pieris rapae L.). Jour. Econ. Ent. 28:714-715.

In dusting experiments in Indiana in 1932 and 1933 on plots of heavily infested cabbage, barium fluosilicate (Dutox) alone or with a carrier (1:1 or 1:4), gave far better results than lead arsenate and lime (1:10). Dusts can be used on cabbage until 2 weeks before marketing without objectionable residues if the loose outer leaves are stripped off.

(549) Dobroscky, I. D.

1935. Preliminary report on the fluorine compounds as insecticides. Jour. Econ. Ent. 28:627-637.

The fluorine compounds particularly natural cryolite, were found to be specific in the control of the tobacco flea beetles (Epitrix parvula Fab. and E. cucumeris Harr.), the eggplant flea beetle (E. fuscula Crotch), and the Mexican bean beetle (Epilachna corrupta Muls.). In field tests natural cryolite was 2 to 2.5 times as effective as manganese arsenate against the Mexican bean beetle. Feeding experiments with the confused flour beetle (Tribolium confusum Duv.) showed natural cryolite to be more toxic than lead arsenate at the lower concentrations. Lime is incompatible with natural cryolite.

(550) Drea, W. F.

1935. Spectrum analysis of hen eggs and chick tissues. Jour. Nutr. 10:351-355.

Fluorine was not present in sufficiently large amounts to be demonstrated. This element probably had no physiological significance. When present in drinking water in amounts larger than 1 part per million, it had a toxic effect.

(551) Fluiter, H. J. de, and Blijdorp, P. A.

1935. De grauwe dennesuitkever Brachyderes incanus L. Tijdschr. Plantenziekten 41:141-211; also Meded. Landbouwhoogesch. [Wageningen] 39(4), 72 pp.

Best results in control of the gray pine weevil were obtained with dusts of sodium fluoride, or sprays, 5 lb. to 400 gal.

(552) Français, J.

1935. Toxicité des insecticides fluoris et en particulier de la cryolithe. Jour. Agr. Prat. 99:483-484.

The soluble fluorine compounds are much less toxic than the soluble arsenic compounds, and the insoluble fluorine compounds are less toxic than the insoluble arsenic compounds. The insoluble insecticides containing fluorine or arsenic are less toxic than the soluble ones. The effect of cryolite on various animals, including the minimum fatal quantity, is given. Cryolite shows considerable value as an insecticide, because it has high toxicity to insects and presents the minimum danger to man and domestic animals.

(553) Froggatt, J. L.

1935. The long-horned tree-hopper of coco-nuts, Sexava spp. New Guinea Agr. Gaz. 1:16-27.

Sodium fluoride added to Tanglefoot in the laboratory killed all the nymphs in 78 hours.

(554) Garman, P.

1935. Further tests with zinc sulfate as a corrective for lead arsenate burn on peaches. Conn. Agr. Expt. Sta. Bull. 368:236-237.

Of various combinations of insecticides tested, only the barium fluosilicate and cryolite sprays gave results equal to check trees as regards the amount of injury to foliage. Further work should be done with these materials as substitutes for lead arsenate.

(555) Gould, G. E.

1935. Insect pests of mint. Ind. Agr. Expt. Sta. Cir. 211, 8 pp.

Against the mint flea beetle (Longitarsus waterhousei Kutsch.) barium fluosilicate gave good control in cage tests but caused some injury to plants in the field.

(556) Glasgow, H.

1935. Substitutes for lead arsenate in cherry fruit fly control. Jour. Econ. Ent. 28:205-207.

Against cherry fruitflies barium fluosilicate and cryolite in some cases gave better control than lead arsenate, but fluorine compounds left objectionable residues.

(557) Gray, R. A. H., and Brooks, H. E.

1935. Spraying trials against the raspberry beetle (Byturus tomentosus Fab.). Jour. Roy. Hort. Soc. 60:339-341.

Tests were made in England with sprays of barium fluosilicate, derris, and nicotine. Derris acted more uniformly, and with slightly less damage to fruit, than barium fluosilicate.

(558) Gui, H. L., and Sleesman, J. P.

1935. Cabbage worms. Ohio Agr. Expt. Sta. Bull. 548:44-45

In investigations on the control of the cabbage worms Autographa brassicae Riley, Ascia rapae L., and Plutella maculipennis Curt. on cabbage, dusts gave better control than sprays. Of 23 insecticides tested, the most efficient were, in order: Paris green, hydrated lime, and flour, 1:2:5; paris green and hydrated lime, 1:7; derris powder (5 percent rotenone), pyrethrum powder, and diatomaceous clay, 1:4:5; barium fluosilicate and flour, 1:7; and derris powder (5 percent rotenone) and diatomaceous clay, 1:9.

(559) Haines, G. C.

1935. The harvester termite. Farming in So. Africa, Reprint 47, 2 pp. [Abstract in Rev. Appl. Ent. (A)23:675-676. 1935.]

The use of poison baits of finely chopped forage soaked in solutions of either sodium fluoride (26 oz. in 8 gal. water) or sodium arsenite (1 gal. in 8 gal. water) is the most effective method of destroying the colonies.

(560) Haller, M. H., Smith, E., and Ryall, A. L.

1935. Spray-residue removal from apples and other fruit. U. S. Dept. Agr. Farmers' Bull. 1752, 26 pp.

Hydrochloric acid is particularly efficaceous in the removal of arsenic, lead, and fluorine residues containing lime in flotation-type or flood-type washers.

(561) Houser, J. S., and Neiswander, R. B.

1935. The apple flea weevil. Ohio Agr. Expt. Sta. Bull 548:42.
Two applications of 5 lb. Dutox (barium fluosilicate), 8 lb. flotation sulfur, and 3 oz. Goulac (dry lignin pitch) in 100 gal. water applied to apple trees in the pre-pink-bud and pink-bud stages gave a significant degree of control and appeared to be superior to lead arsenate and lime-sulfur in the control of the apple flea weevil (Orchestes pallicornis Say).

(562) Indiana Agricultural Experiment Station.

1935. [European corn borer.] Ind. Agr. Expt. Sta. Rept. 47:34.
Calcium fluosilicate spray was effective on corn against the European corn borer.

(563) Indiana Agricultural Experiment Station.

1935. [Striped cucumber beetle.] Ind. Agr. Expt. Sta. Rept. 47:34.
The striped cucumber beetle, which continued to cause much damage to melons and cucumbers, was best controlled by a dust of 1 part barium fluosilicate with 3 parts flour, talc, or colloidal clay.

(564) Jancke, O.

1935. Über Spritzschäden an Kirschen nach Anwendung von Fluornatriumlösungen zur Bekämpfung der Kirschfliege. Anz. Schädlingskunde 11:81-84.
Sodium fluoride bait sprays did not cause any foliage injury in 1931 and 1932 and were highly effective against the cherry fruitfly (Rhagoletis cerasi L.), but in 1933 they scorched as much as 12 percent of the cherries and leaves.

(565) Jarvis, H.

1935. Codling moth control by nonarsenical sprays. Queensland Agr. Jour. 43:5-8.
Apples received five sprays of barium fluosilicate (1 lb. to 40 gal.) or of lead arsenate (1 lb. to 40 gal.). The percentages of sound apples at picking time were 55.5 and 84.6, respectively.

(566) Kick, C. H., Bethke, R. M., Edgington, B. H., Wilder, O. H. M., Record, P. R., Wilder, W., Hill, T. J., and Chase, S. W.

1935. Fluorine in animal nutrition. Ohio Agr. Expt. Sta. Bull. 558, 77 pp.
The toxicity of fluorine varied with the form fed. Sodium fluoride was much more toxic to pigs, rats, and chicks than calcium fluoride when fed at comparable fluorine rates. Many data are given on the physiological action of fluorine.

(567) Lange, W.

1935. Fortschritte auf dem Gebiete der Darstellung und Verwendung von Fluorverbindungen. Chem. Ztg. 59:393-395.

A review of the methods of preparation and uses of fluorine compounds.

(568) Lebedinskaya, M. G.

1935. Chemical control of young adults of the apple blossom weevil. Plant Protection (U.S.S.R.) Fasc. 3, pp. 117-118. [In Russian. Abstract in Rev. Appl. Ent. (A) 23:617. 1935.]

Against adults of the apple blossom weevil (Anthonomus pomorum L.) sodium fluosilicate gave a high mortality.

(569) Loewe, S., and Salfeld, H.

1935. "Mottling of enamel" effected by a single fluorine dose. Soc. Expt. Biol. and Med. Proc. 32:1649-1651.

Doses of 9 to 37 mg. of fluorine per kilogram of body weight were administered in the form of sodium or calcium fluoride to albino rats just weaned. In 3 out of 10 animals a milky-white spot appeared on one lower incisor 12 to 14 days after ingestion of the fluorine. Acute and chronic fluorine action differ only in the extensiveness of the effect and in the dosage necessary to produce a visible effect.

(570) MacIntire, W. H., Shaw, W. M., and Robinson, B.

1935. A barium-fluorine study. The fate of added barium silicofluoride and its effect upon sulfates and other soil components as influenced by limestone and by dolomite. Tenn. Agr. Expt. Sta. Bull. 155, 31 pp.

A detailed description of a 4-year lysimeter study of the chemical behavior of the biological influences exerted by barium and fluorine in additions to the soil as barium fluosilicate, intended to determine the effects upon (1) supplies of soil sulfates, (2) biological end products, (3) exchange reactions, fate and ultimate combinations induced by single and replicated additions, and (4) any divergent effects exerted upon the foregoing by supplements of limestone and of dolomite.

The formation of calcium fluoride, except when vitiated by dolomite-derived magnesium fluoride, was considered to show a common fate of all fluorine additions and hence to insure a low fluorine solubility in the soil system. The repressive effect of supplemental calcium salts upon calcium fluoride solubility in the soil is considered to obviate any cumulative toxic effect from increments derived from dusts and sprays of fluorine materials and from calcium fluoride introduced by additions of phosphatic fertilizer.

(571) McKenzie, H. L.

1935. Life history and control of the gladiolus thrips in California. Calif. Agr. Expt. Sta. Cir. 337, 16 pp.

Cryolite and potassium fluoaluminate sprays cannot be used safely on gladiolus plants along the coast, probably because of the high humidity.

(572) McMurray, C. A.

1935. Mottled enamel. Southwest Water Works Jour. 17(4):18-19. [Abstract in Chem. Abs. 30:199, 1936.]

Of 400 children between the ages of 6 and 13 years, 98 developed mottled enamel of teeth after using exclusively water that contained 4.4 parts per million of fluorine.

(573) Mauritius Department of Agriculture.

1935. The cutworms: Prodenia litura F. and Spodoptera mauritia Bdv. Mauritius Dept. Agr. Ann. Rept. 1934:26.

Poisoned bait made up of sliced cactus and sodium fluoride gave good results against the cutworms Prodenia litura F. and Spodoptera mauritia Bdv.

(574) Moll, F.

1935. Die Verwendung von Zinksalzen zum Holzschultz. Holzmarkt. 1935:3-4. [Abstract in Rev. Appl. Mycol. 14:542.]

Estimated by weight, the toxic activity to wood-destroying fungi of the fluorine ion is nearly four times that of the zinc ion and the efficacy of zinc fluoride and zinc fluosilicate in proportion to that of zinc chloride is 237 and 307, respectively, to 49. Fluralsil, a zinc fluosilicate preparation, is particularly effective for the general protection of mine timbers and against dry rot (Merulius lacrymans).

(575) Newton, J. H.

1935. Codling-moth control experiments of 1934. Colo. State Ent. Cir. 65, 23 pp.

Cryolite (sodium fluoaluminate) in cover sprays gave control equal, or in some cases superior, to that obtained with lead arsenate. Acid washes cannot be depended on to remove fluorine spray deposits.

(576) Newton, J. H.

1935. Codling moth studies. North Fork Valley of Colorado. Colo. Agr. Expt. Sta. Bull. 414, 47 pp.

Four cover sprays of lead arsenate or cryolite gave approximately equal control, fish oil being used with the cryolite. Barium fluosilicate and fish oil did not give uniformly satisfactory results.

(577) Patterson, N. A.

1935. Indices of toxicity for various poisons to Drosophila ampelophila Loew. Ent. Soc. Ontario, Ann. Rept. 65:78-80.

The relative toxicities of 63 substances were determined by feeding Drosophila ampelophila Loew baits containing them. Sodium fluoride and sodium fluosilicate were among the more toxic substances.

(578) Pázler, J.

1935. The caterpillar of Agrotis segetum Schiff. and its extermination. Listy Cukrovar. 54:1-6. [In Czech. Abstract in Chem. Abs. 30:219. 1936.]

Sodium fluoride and sodium fluosilicate in 0.5-kg. quantities were applied to 25 kg. of dry wheat middlings and moistened with molasses for use as bait.

(579) Persing, C. O.

1935. A discussion of various oils in spray combinations with lead arsenate, cryolite and barium fluosilicate. Jour. Econ. Ent. 28:933-940.

The behavior of the various types of mineral-oil emulsions with the fluorine compounds differed greatly. Some of the oils possessed great wetting power, as the particles of the fluorine compounds were centralized in the oil phase of the emulsion. In all cases where the cryolite or barium fluosilicate remained in the oil phase there was a heavy deposit, excellent spreading and wetting, and relatively high toxicity to codling moth larvae on ripe apples. In general the so-called emulsive oils were much more efficient in spreading and depositing cryolite or barium fluosilicate than were the other types of emulsions that were used. With certain of the emulsive oils better results were obtained by thoroughly mixing the cryolite or barium fluosilicate in a thin paste before placing it in the tank.

(580) Phillips, P. H., English, H., and Hart, E. B.

1935. The augmentation of the toxicity of fluorosis in the chick by feeding desiccated thyroid. Jour. Nutr. 10:399-407.

When fed sodium fluoride, the relatively harmless level of 0.2 percent desiccated thyroid produced results similar to those given by the highly toxic level of 0.6 percent.

(581) Phillips, P. H., Halpin, J. G., and Hart, E. B.

1935. The influence of chronic fluorine toxicosis in laying hens upon the fluorine content of the egg and its relation to the lipoid content of the egg yolk. Jour. Nutr. 10:93-98.

The addition of fluorine in the form of rock phosphate to the rations of laying hens resulted in a measurable increase in the fluorine content of the eggs. The fluorine accompanied the constitutents of the egg yolk. Fluorine appeared to be present in minute quantities in the normal egg. Increased fluorine ingestion did not reduce the size of the egg.

(582) Pilat, M.

1935. Histological researches into the action of insecticides on the intestinal tube of insects. Bull. Ent. Research 26: 165-172.

Sodium fluoride, sodium fluosilicate, sodium arsenite, calcium arsenite, and paris green were fed to larvae of the small tortoise-shell butterfly (Aglais urticae) gypsy moth (Porthetria dispar) cabbage butterfly (Pieris brassicae) and nymphs of the mogratory locust (Locusta migratoria). Certain peculiar histological features are manifest in the epithelium when fluorine compounds are used. The histological picture of the poisoned intestine corresponds with that of the hemolymph of the same insect.

(583) Pilat, M.

1935. The effects of intestinal poisoning on the blood of locusts (Locusta migratoria). Bull. Ent. Research 26(3):283-288.

Poisoning was effected by sodium arsenite and sodium fluosilicate. Influence of the poison on the blood was not discoverable.

(584) Poda, E.

1935. Ricerca e determinazione chimico-microscopica del fluoro nelle acque naturali. Ann. Chim. App. [Rome] 25:225-227.

The micro test of Behrens (formation of crystals of sodium fluosilicate) has been adopted in the determination of fluorine in mineral waters. When a known volume of water is used, the amount of fluorine is estimated by counting the number of sodium fluosilicate crystals formed.

(585) Raucourt, M.

1935. Observations sur les produits utilisés en 1935 dans la lutte contre le doryphore. Compt. Rend. Acad. Agr. France 21:1111-1116.

For the control of the Colorado potato beetle barium fluosilicate with three or four times its weight of carrier, such as talc, gave initial results comparable with those of lead arsenate dusts. Apparently its effect is not so lasting.

(586) Reynolds, D. S.

1935. Further studies on the Willard and Winter method for the determination of fluorine. Jour. Assoc. Offic. Agr. Chem. 18:108-113.

Precipitated silica on the walls of the distillation flask may cause error due to absorption of fluorine. Phosphates distilled over also cause errors in the titration with thorium nitrate.

(587) Ripley, L. B., and Hepburn, G. A.

1935. Fruit-fly in citrus: Results with sodium fluosilicate bait. Union So. Africa Dept. Agr., Sci. Bull. 143, 8 pp.

Promising control of Mediterranean fruitfly on citrus was obtained by spraying the trees with a solution of sodium fluosilicate (0.25 oz.) and white sugar (0.5 lb.) in 1 gal. of water at the rate of 3 to 12 oz. per tree according to size.

(588) Roark, R. C.

1935. Insecticides and fungicides of the future likely to be specifics of organic origin. du Pont Agr. News Letter 9(8):1-6.

The estimated consumption of sodium fluoride, as a fungicide in the United States during 1934 was 4,000,000 pounds. Considerable quantities of cryolite were also used.

(589) Rust, S. F.

1935. Some aspects of wood preservation in Australia and U. S. A. Jour. Brit. Wood Preservers Assoc. 5:43-56. [Abstract in Chem. Abs. 29:7039-7040. 1935.]

The present trend is toward the fluorizing process (sodium fluoride, arsenious oxide, and sodium dinitrophenol).

(590) Savchenko, E. N.

1935. Zur Frage des Einflusses der Insekticiden auf die Nicotiana rustica und Zigarrentabakpflanzen bei der Bespritzung der letzten. Sborn. Rab. Ent. Otd. VIM Pa [Coll. Works Ent. Sect. All-Un. Inst. Makhorka Industry]. p. 31-69. 1935. [In Russian. Abstract in Rev. Appl. Ent. (A) 24:52. 1936.]

The author concludes that sprays containing 0.7-0.9 percent of sodium fluosilicate on tobacco and 0.7 percent of sodium fluoride on N. rustica may be applied. The tests of the fluosilicate on N. rustica and the fluoride on tobacco were inconclusive.

(591) Schour, I., and Smith, M. C.

1935. Mottled teeth: an experimental and histologic analysis. Jour. Amer. Dent. Assoc. 22:796-813.

A histological study of the production of mottled enamel in albino rats by administration of sodium fluoride.

(592) Scott, E. W., and Henne, A. L.

1935. Titration of fluorine in biological materials. Indus. and Engin. Chem., Analyt. Ed. 7:299-300.

A standardized procedure is given for ashing plant and animal tissues for the volatilization of the fluorine by distillation with perchloric acid and for the titration of the fluorine with cerous nitrate or thorium nitrate. Amounts of fluorine as low as 0.02 mg. can be detected. Standardized conditions for calcination, distillation, and titration are presented.

(593) Skalov, Y. Y., and Miram, E. F.

1935. Injurious grasshoppers of tobacco-growing areas in Crimea. Yalta, All-Un. Inst. Tobacco Ind., St. Publ. Crimean A.S.S.R. [In Russian. Abstract in Rev. Appl. Ent. (A) 23:581. 1935.]

The best control of grasshoppers that attack tobacco was obtained by dusting with sodium fluosilicate, either alone or mixed with a carrier at the rate of 1:10 or 1:20.

(594) Smith, H. V.

1935. Determination of fluorine in drinking water. Indus. and Engin. Chem., Analyt. Ed. 7:23-25.

A comparison of the fluoride content of 44 waters has been made by the Fairchild, Foster, Willard, and Sanchis methods. Results obtained by the Foster, Willard, and Sanchis methods are in close agreement; those by the Fairchild method average two or three times higher. Concentrations of fluorine 0.9 to 1.0 part per million and greater (Foster, Willard, or Sanchis method) have been associated with mottled enamel. Concentrations of fluorine as high as 0.7 to 0.8 part per million (Foster, Willard, or Sanchis method) have been found in waters not associated with mottled enamel. No water containing more than 1.0 part per million of fluorine has been found which is not definitely associated with mottled enamel. No water containing less than 0.8 part per million has been found which is known to cause mottled enamel.

(595) Smith, H. V.

1935. Potability of water from the standpoint of fluorine content. Amer. Jour. Pub. Health 25:434-439.

A concentration of 0.8 to 0.9 part per million of fluorine in water has been found to cause mottled enamel in children if this water is consumed while they are of a susceptible age. Four methods of analysis are compared. The Foster method is not satisfactory on waters treated with aluminum sulfate if considerable aluminum remains in solution

(596) Smith, M. C.

1935. Fluorine toxicosis, a public health problem. Amer. Jour. Pub. Health 25:696-702.

Special emphasis is given to the low human tolerance for fluorine and to the danger of increased prevalence of mottled enamel in all sections of the country as a result of the greater use of fluorine compounds as insecticides.

(597) Smith, M. C., Lant., E. M., and Smith, H. V.

1935. Further studies in mottled enamel. Jour. Amer. Dent. Assoc. 22:817-829.

A comprehensive summary of the effects of small quantities of fluorides on man and animals.

(598) Smith, M. C., and Smith, H. V.

1935. The occurrence of mottled enamel on the temporary teeth. Jour. Amer. Dent. Assoc. 22:814-817.

Mottled enamel has been found on the deciduous teeth of several children whose supply of drinking water contained 12 to 18 parts per million of fluorine.

(599) Sorogozhskaya.

1935. Tests of poisons in the control of the cherry sawfly. Plant Protection (U.S.S.R.) No. 7, p. 118. [In Russian. Abstract in Rev. Appl. Ent. (A) 23:618. 1935.]

In field experiments against the sawfly Caliroa limacina Retz, sodium fluosilicate used in 0.5 percent concentration gave 31.2 to 70 percent, and in 0.75 percent concentration gave 51.7 to 84.1 percent control.

(600) Steer, W., and Thomas, F. J. D.

1935. Field spraying and dusting trials on the control of apple blossom weevil and of apple sawfly in 1934. East Malling Research Sta., Ann. Rept. 22:194-204.

A barium fluosilicate dust (barium fluosilicate 72, sodium aluminum fluoride 8, and inert material 20 percent) was ineffective in preventing oviposition by the apple blossom weevil (Anthonomus pomorum L.) and was inferior to derris as a protection against the apple sawfly (Hoplocampa testudinea Klug).

(601) Thomas, F. J. D.

1935. Preliminary experiments on the control of apple surface-eating tortricid larvae. East Malling Research Sta. Ann. Rept. 22:205-207.

A spray containing 4 lb. of barium fluosilicate and 1 lb. of "Agrate N" per 100 gal. was less effective than a derris spray against larvae of Cacoecia podana Scop.

(602) Trage, H.

1935. Impregnating wood. Austrian patent 142,431; issued July 25. [In German. Abstract in Chem. Abs. 29:8281. 1935.]

Freshly felled timber, still containing sap but free from bark, is covered over its whole surface with a pasty or solid water-soluble preservative, which is allowed to remain until it has penetrated sufficiently into the wood by osmosis. A suitable paste is made from a mixture of sodium fluoride 80, sodium dinitrophenolate 15, and kieselguhr 5 percent.

(603) Turner, N.

1935. Tests on the control of certain vegetable insects. Conn. Agr. Expt. Sta. Bull. 368:245-247.

In tests to control the potato flea beetle (Epitrix cucumeris Harr.) barium fluosilicate dust applied in June followed by bordeaux mixture in July, August, and September produced the highest yield of potatoes. The dust did not control leafhoppers.

(604) Turner, N.

1935. Control of clothes moths. Conn. Agr. Expt. Sta. Bull. 368: 252.

"Larvex" a proprietary compound containing sodium aluminum silicofluoride [sic] was satisfactory against the larvae of the webbing clothes moth (Tinecla biselliella Hum.).

(605) Turner, N., and Friend, R. B.

1935. Further experiments on Mexican bean beetle control. Conn. Agr. Expt. Sta. Bull. 371, 452 pp.

Magnesium arsenate sprays and dusts, barium fluosilicate sprays and dusts, copper-lime-calcium arsenate dusts, and derris and pyrethrum dusts controlled bean beetles satisfactorily and gave substantial increases in yield.

(606) United States Department of Agriculture, Bureau of Entomology and Plant Quarantine.

1935. Peach insects. U. S. Dept. Agr., Bureau Ent. and Plant Quar. Ann. Rept. 1935:3.

Sprays of barium fluosilicate or synthetic or natural cryolite injured peach trees severely when applied to control the plum curculio.

(607) United States Department of Agriculture, Bureau of Entomology and Plant Quarantine.

1935. Tobacco insects. U. S. Dept. Agr., Bureau Ent. and Plant Quar. Ann. Rept. 1935:45-46.

Barium fluosilicate and cryolite injured the plants when dusted in seed beds to control the tobacco flea beetle.

(608) United States Department of Agriculture, Food and Drug Administration.

1935. Revised rapid method for determination of fluorine spray residues on apples and pears. U. S. Dept. Agr., Food and Drug Admin., Mimeo. Publ., 7 pp.

Details are given for determining fluorine spray residue on apples and pears, using a colorimetric method. The amount of fluorine is determined by measuring the bleaching effect of the fluoride ion on peroxidized titanium solutions.

(609) Vinas, J.

1935. Les vers de la vigne et les poudrages au fluosilicate de baryum en 1934. Compt. Rend. Acad. Agr. France 21:507-513.

Vines were treated with 10 and 20 percent dusts of barium fluosilicate against the overwintered larvae of Sparganothis pilleriana Schiff. and with 10 percent dusts against the third generation of Polychrosis botrana Schiff. Single applications of the weaker dust appeared to give about 60 percent control of Sparganothis and nearly 70 percent control of Polychrosis. Dusting with barium fluosilicate is the only measure legal against the last generation of Polychrosis.

(610) White, R. P., and Hamilton, C. C.

1935. Diseases and insect pests of rhododendron and azalea. N. J. Agr. Expt. Sta. Cir. 350, 23 pp.

A useful attractant and poison for black vine weevils (Brachyrhinus sulcatus Fab.) consists of apple pulp impregnated with 3.5 percent of sodium fluosilicate.

(611) White, W. H.

1935. A summary of studies on arsenical substitutes for cabbage worm control on cabbages and limitations on arsenical treatments. Jour. Econ. Ent. 28:607-609.

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INDEX OF AUTHORS

Anonymous, 57, 58, 179, 180, 375, 452
Abbott, W. S. See Scott, E. W.
Abel, E. G., 304, 690
Adams, E. W. See Sullivan, F. W., Jr.
Alabama Agricultural Experiment Station, 181, 230, 231
Allen, A. P., 656
Allen, N. See Smith, E. C.
Allman, S. L., 530
Alvord, E. B., 679
Anderson, H. W., 111
Anderson, L. D., and Walker, H. G., 453
Andrewartha, H. G., 232, 305
Anthony, M. V. See Marcovitch, S.
Arkansas Agricultural Experiment Station, 79, 80
Armstrong, W. D., 376, 377
Attia, R., 306
Atwell, H. C., 112
Atwood, W. G. See Fisher, A.
Austin, G. D., 113
Australia Advisory Council for Scientific and Industrial Research, 454
Bachmann, W., 136
Back, E. A., 307
Baerg, W. J., 67, 137, 308
Ballard, E., Mistikawi, A. M., and El Zoheiry, M. S., 309
Balwant, S. See D'Costa, J.
Bardia, R. See Nonell Comos, J.
Barr, H. T., 182
Barrett, R. E., 310
Bartholomew, R. P., 531
Basinger, A. J., and Boyce, A. M., 532
Batchelder, Z., and Meloche, V. W. 233
Batiashvili, I. D., 234
Becker, G. A., 183
Behr, F. von, 649
Bethke, R. M. See Kick, C. H.
Bibby, F. F. See Moreland, R. W.
Bigger, J. H., 533
Biron, M., 184
Bishop, H. J., 455
Bishopp, F. C., 19, 158. See also Wells, R. W.
Bishopp, F. C., and Wagner, R. D., 235
Bishopp, F. C. and Wood, H. P., 20, 21
Blanchard, R. A., and Conger, C. B., 311
Bleek, J., 534
Blijdorp, P. A., 535. See also Fluiter, H. J. de.
Blumenberg, H., Jr., 642
Blunk, H., and Kaufmann, O., 312
Bobb, M. L., 536
Böhmel, W. See Jancke, O.
Bogdanov-Kat'kov, N. N., 313
Bohstedt, G. See Hart, E. B.
Bohstedt, G. B. See Phillips, P. H.
Bonde, R., Folsom, D., and Tobey, E. R. 159
Bondy, F. F., 236
Borchers, W., 185
Borden, A. D., 537, 538. See also Woglum, R. S.
Bornemann, F. See König, J.
Bottger, G. T. See Simanton, F. L.
Bourne, A. I., 378, 456
Bousquet, E. W. See Salzberg, P. L.
Boyce, A. M., 237, 314, 379, 539. See also Basinger, A. J.
Boyd, J. E. M., 46
Brannon, L. W., 457. See also Howard, N. F.
Brause, G. See Matthes, H.
Bredemann, G., and Radeloff, H., 315
Bremer, H., and Kaufmann, O., 114
Brioux, C., and Louis, E., 458
British Guiana Department of Agriculture, 540
Brittain, W. H., 68
Britton, W. E., 380
Brooks, H. W. See Gray, R. A. H.
Broudy, H., 541
Brown, L. See Siegler, E. H.
Browne, A. C., 238
Bruel, W. van den. See Mayne, R.
Bryan, J., and Richardson, N. A., 542
Bryson, H. R. See Wilbur, D. A.
Bucalossi, E. 381
Buchanan, G. H., 658
Buchner, M., 672
Burgess, R., 543
Burgess, R., and Poole, E. J., 239
Burt, B. C., and Dutt, G. R., 186

Busbey, R. L. See Roark, R. C.
Butler, L. See Winter, O. B.
Caesar, L., 53
Caffrey, D. J., and Worthley, L. H., 382
California Agricultural Experiment Station, 81, 240, 316, 317, 318, 319
Campbell, F. L., 187. See also Elmore, J. C.
Campbell, F. L., and Filmer, R. S., 160
Canada Department of Agriculture, 22
Carles, P., 2
Carlos, A. S., 188
Carruth, L. A. See Munro, J. A.
Carter, R. H., 161, 189, 190, 241, 242, 320, 321, 322, 323, 459, 544, 667, 668, 669. See also Newcomer, E. J.; Shepard, H. H.; Smith, E.
Cartwright, O. L., 191
Casares, J., and Casares, R., 192
Casares, J., and Salinas, T., 545
Casares, R. See Casares, J.
Ceylon Department of Agriculture, 162, 383
Chamberlin, F. S., 324, 384
Chapman, P. J., and Gould, G. E. 193
Chapman, P. J., and Hammer, O. H. 460
Chase, S. W. See Kick, C. H.
Chemische Fabrik Ludwig Meyer, 243
Cholak, J. See Hachle, W.
Churchill, H. V., 244
Clarke, W. K. See Eddy, C. O.
Clarke. W. T., 47
Clausmann, P. See Gautier, A.
Clay, L., 163
Cleveland, C. R., 115
Cobenzl, A., 40
Compton, C. C., and Flint, W. P., 116
Conger, C. B. See Blanchard, R. A.
Conquest, V., 685
Cottier, W., 546
Cowan, F. T., 461
Cox, A. J., 385
Crumb, S. E., 82
Cummins, J. E., 325
Curtin, L. P., 625
Cutright, C. R., 462
Dahle, Dan. See Wichmann, H. J.
Daniels, L. B., 386
Davis, A. C. See Elmore, J. C.
Davis, E. G., 387. See also Mote, D. C.
D'Costa, J., and Balwant, S., 194
Dean, F. P. See Newcomer, E. J.
Decoux, L., and Roland, G., 388
DeEds, F., 389, 390
DeEds, F., and Thomas, J. O., 463
Delage, B., 245
Delassus, 547
Delassus, M., 246
DeLong, D. M., 464
DeOng, E. R., 59
Diamond, V. R., 548
Dicke, F. G. See Simanton, F. L.
Dietz, H. F., and Zeisert, E. E., 465
Dimick, R. E., and Mote, D. C., 466
Dobroscky, I. D., 549
Douglas, W. A., 195
Douglas, J. R., 467
Downes, W., 117, 247
Drake, C. J., and Harris, H. M., 118
Drea, W. F., 550
Driggers, B. F., 119
Dubois, R., 468
Dudley, J. E., Jr. See Scott, E. W.
Du Pont, E. I., De Nemours and Company, 391
Dutcher, H. A. See Smith, O. M.
Dutt, G. R. See Burt, B. C.
Dyson, G. M., 248
Eckoldt, E., 662
Eddy, C. I., and Clarke, W. H., 164
Eddy, C. I., and McAlister, L. C. Jr., 120
Edgington, B. H. See Kick, C. H.
Edwards, W. H., 83
Electro Chemical Processes, Ltd., 469
Elmore, J. C., 392
Elmore, J. C., Davis, A. C., and Campbell, R. E., 470
Elvove, J., 393
El Zoheiry, M. S. See Ballard, E.
Engelmann, M., 653
Engels, W. See Pflug, H.
English, H. See Phillips, P. H.
Ewing, K. P., 249
Eyer, J. R., 121. See also Runner, G. A.
Fahey, J. E. See Smith, E.; Steiner, L.F

Fairbrother, T. H., 250
Fairchild, J. G., 196
Fergusson, H., 326
Feytaud, J., 327, 471
Ficht, G. A., 394
Filmer, R. S. See Campbell, F. L.
Fisher, A., and Atwood, W. G., 666
Fitch, C. P., 28
Fleming, W. E., 122
Flint, W. P., 395. See also Compton, C. C.
Flint, W. P., and Hockenyos, G. L., 687
Florida Agricultural Experiment Station, 197, 328
Fluiter, H. J. de, and Blijdorp, P. A., 551
Folsom, D. See Bonde, R.
Forsell, M. J., 624
Foster, M. D., 396
Francais, J., 552
France, Ministere de L'Agriculture, Station de Zoologie Agricole du Sud-Ouest, 397
Freeborn, S. B., and Wymore, F. H., 165
Friend, R. B. See Turner, N.
Friend, R. B., and Turner, N., 251
Frere, J., 139, 398
Froggatt, J. L, 553
Frost, S. W., 329
Fulton, B. B., 54, 140, 399
Garman, P., 141, 472, 554
Gasow, H., 84, 85, 123
Gautier, A., 4, 6, 9
Gautier, A., and Clausmann, P., 7, 8, 12, 32, 33
Gehauf, B., and Walker, H. W., 623
Gentner, L. G., 86
Gibson, A., 13
Gimingham, C. T., See Tattersfield, F.
Gimingham, C. T., and Tattersfield, F., 142
Ginsburg, D. See Sakharov, N.
Gitzen, W. H., and Wagner, G. H., 680
Glasgow, H., 556
Glover, L. H. See Richardson, C. H.
Gmelin, L., 87
Goetze, G., and Schleusener, W., 330
Golding, F. D., 331
Goss, B. C., 675
Gould, G. E., 555. See also Chapman, P. J.
Graham, J. J. T. See Smith, C. M.
Gray, R. A. H., and Brooks, H. E., 557
Greaves, C., 400
Groombridge, W. H., 651
Gross, C. R. See Smith, E.
Grubenholzimpragnierung, G.m.b.H., 198 199, 200, 252
Gui, H. L., and Sleesman, J. P., 558
Guillissen, J., and Union Chimique Belge, Societe Anonyme, 253
Guyton, F. E., 88
Gwin, C. M., 401
Haas, L. E. See Richardson, C. H.
Habegger, H., 332
Hagood, J., 689
Haines, G. C., 473, 559
Haley, W. E. See Holloway, T. E.
Hall, M. C., 23
Hall, M. C., and Wigdor, M., 29
Haller, M. H., Smith, E., and Ryall, A. L., 560
Halpin, J. G. See Phillips, P. H.
Halpin, J. G., and Hayes, J. B., 254
Hamilton, C. C., 255
Hamilton, E. H. See Smith, C. M.
Hammer, O. H., 333, 402. See also Chapman, P. J.
Hanson, A. J., 403
Hardtmann, M. See Hartmann, E.
Hargreaves, E., 60
Harman, S. W., 474
Harris, H. M. See Drake, C. J.
Harris, Parley F., 633
Hart, E. B. See Phillips, P. H.
Hart, E. B., Phillips, P. H., and Bohstedt, G., 475
Hartman, E. F., and Whitmore, W. F., 688
Hartmann, E., Hardtmann, M., and Kümmel, P., 650
Hasemann, L., and Johnson, P. H.,404
Hatfield, I., 256, 334
Hauck, H. M., 476
Hayes, J. B. See Halpin, J. G.
Henne, A. L. See Scott, E. W.
Henninger, A. H., 681
Hepburn, G. A. See Ripley, L. B.
Herrick, G.W., 89
Hey, G. L., and Steer, W., 477
Hickey, C. H., 3
Higbee, H. C., 1

Hill, S. B., Jr., Yothers, W. W., and Miller, R. L., 478
Hill, T. J. See Kick, C. H
Himmelsbach, J., 405
Hinds, W. E., 166, 201
Hinds, W. E., and Osterberger, B. A., 257
Hinds, W. E., and Spencer, H., 124, 125, 143
Hixson, E., 406
Hockenyos, G. L., 407. See also Flint, W. P.
Hodson, W. E. H., 258
Hoffman, J. I., and Lundell, G. E. F., 167
Holloway, T. E., Haley, W. E., and Ingram, J. W., 69
Holt, J. J. H., 14
Holton, E. C., 617, 618, 619, 620
Holzapfel, A. C., 622
Hough, W. S., 408, 479, 480
Houser, J. S., and Neiswander, R. B., 561
Howard, H., 626
Howard, N. F., Brannon, L. W., and Mason, H. C., 409
Howells, L. T., 655
Huber, L. L., Polivka, J. B., and Savage, J. R., 481
Huckett, H. C., 168, 259
Humphreys, F. E. See Robertson, M. E.
I. G. Farbenindustrie, A.-G., 144, 169, 202, 335
Iigura, S., 260
Illingworth, J. F., 24.
Imes, W., 90
India, United Provinces of Agra and Oudh, 203
Indiana Agricultural Experiment Station, 336, 337, 562, 563
Indiana Department of Conservation, 91
Ingram, J. W., 92. See also Holloway, T. E.
Iowa Agricultural Experiment Station, 93
Isely, D., 126
Jackson, A. C., and Lefroy, H. M., 25
Jacobs, K. D. See Marshall, H. L.
Jacobson, C. A., and Pray, H. A. H. 145
Jancke, O., 204, 261, 482, 564
Jancke, O., and Böhmel, W., 410
Jarvis, H., 411, 565,
Jay, B. A., 483
Jewett, H. H., 127
Johnson, P. H. See Haseman, L.
Johnston, W. S. See McKee, R. H.
Joubert, C. J., 262
Jouis, E. See Brioux, C.
Kadocsa, G., 41
Kahn, F. J. See Nesmejanov, A. N.
Kaltenbach, R. G., 338
Kaufmann, O. See Blunck, H.; See Bremer, H.
Kearns, H. G. H., 484
Kearns, H. G. H., and Walton, C. L., 412
Kennard, D. C., 61
Kerr, A. P., and Smith, C. E., 70
Kick, C. H., Bethke, R. M., Edgington, B. H., Wilder, O. H. M., Record, P. R., Wilder, W., Hill, T. J., and Chase, S. W., 566
Kitchin, J. W., and Lefebure, V., 616
Kitzmiller, K. See Machle, W.
König, J. See Pflug, H.
König, J., and Bornemann, F., 413
König, J. and Mengele, H., 339, 340
Körting, A., 415
Korab, I. I., and Zalking, M. D., 414
Kramer, H., 263
Kuhn, H. A., 170
Kümmel, P. See Hartmann, E.
Laake, E. W. See Wells, R. W.
Lacroix, D. S., 264, 485
La Follette, J. R. See Woglum, R. S.
Laing, F., 205
Lamb, A. R. See Phillips, P. H
Landon, W. E. See Woglum, R. S.
Lange, E., and Müller, E., 206
Lange, W., 567
Langenbuch, R., and Schewket, N., 265
Langford, G. S., 94. See also Sanders, P. D.
Lantz, E. M. See Smith, M. C.
Lantz, E. M., and Smith, M. C., 486
Large, E. C., 692
Lathrop, E. C. See Munroe, T. B.
Lebedinskaya, M. G., 568
Fefebure, V. See Kitchin, J. W.
Lefroy, H. M. See Jackson, A. C.
Leverton, R. M. See Smith, M. C.

Levkovtezeva, V. See Sinitzkii, N.
Lewis, H. C. See Woglum, R. S.
Liebknecht, O., 648
Light, S. F., Randall, M., and White, F. G., 207
Lipp, J. W., 171
List, G. M., 341
Lloyd, D. J., 416
Lloyd, L., 35, 36
Loewe, S., and Salfeld, H., 569
Louisiana Agricultural Experiment Station, 71
Lovell, O. H., 342
Lundell, G. E. F. See Hoffman, J. I.
Lyle, C., 128, 129, 146
Lysaght, A. M., 208
McAlister, L. C., and Van Leeuwen, E. R., 209
McAlister, L. C., Jr. See Eddy, C. I.
McBride, O. C. See Miller, R. L.
MacCreary, D., 417
McCulloch, R. N., 343
McDaniel, E., 42, 48
McGregor, E. A., 487
Machle, W., Thamann, F., Kitzmiller, and Cholak, J., 489
MacIntire, W. H., Shaw, W. M., and Robinson, B., 570
McKee, R. H., and Johnston, W. S., 488
McKenzie, H. L., 418, 571
Mackie, D. B., 345
McMurray, C. A., 572
McNeel, T. E., 344
McQuaid, Howard S., 635
Malenkovic, B. R. V., 659
Malenotti, E., 346, 419, 420, 421
Mamonov, B. A., 210, 211
Marcovitch, S., 62, 63, 72, 73, 95, 96, 147, 151, 172, 173, 347, 442, 490
Marcovitch, S., and Anthony, M. V., 266
Marcovitch, S., and Stanley, W. W., 174, 212, 213, 267
Marcovitch, S., Stanley, W. W., and Anthony, M. V., 268
Marlatt, C. L., 10
Marriott, R. H. See Robertson, H. E.
Marshall, H. L., Jacobs, K. D., and Reynolds, D. S., 348
Marshall, J., 74
Mason, H. C. See Howard, N. F.
Matthes, H., and Brause, G., 55
Mauritius Department of Agriculture, 573
Mayne, R., 349
Mayne, R., and Bruel, W. van den, 423
Meckbach, Ernest, 639
Meigs, F. M. See Salzberg, P. L.
Melander, A. L., and Spuler, A., 97
Meloche, V. W. See Batchelder, G.
Mengele, H. See König, J.; Pflug, H.
Menzies, W. C., 646
Metzger, F. W., 424
Michigan Agricultural Experiment Station, 214
Miller, R. L. See Hiller, S. B., Jr.
Miller, R. L., and McBride, O. C., 269
Mills, J. E., 98. See also Walker, H. W.
Minaeff, M. G., 629, 630, 631
Minaeff, M. G., and Sachs, A. P. 628, 632
Minaeff, M. G., and Wright, J. H., 175
Miram, E. F. See Skaolv, Y. Y.
Mississippi State Plant Board, 130
Mistikawi, A. M. See Ballard, E.
Mitchener, A. V., 425
Moll, F., 574. See also Pflug, H.
Moreland, R. W., and Bibby, F. F., 270
Morton, F. A. See Parker, J. R.
Mossop, M. C. See Pettery, F. W.
Mote, D. C. See Dimick, R. E.
Mote, D. C., and Wilcox, J., 131
Mote, D. C., Wilcox, J., and Davis, E. G., 99
Müller, E. See Lange, W.
Müller, K. R., 271
Muggeridge, J., 132
Munro, J. A., and Carruth, L. A., 350
Munroe, T. B., and Lathrop, E. C., 663, 665
Murray, C. W. See Smith, E.
Mysore Department of Agriculture, 351
Nakamura, S. See Suzuki, H.
Nash, R. W., 491
Nawa, S., 272
Neiswander, R. B. See Houser, J. S.
Nesmejanov, A. N., and Kahn, E. J., 492
Nevskii, V. P., 493
New Jersey Agricultural Experiment Station, 273
New Mexico Agricultural Experiment Station, 352

New York (Geneva) Agricultural Experiment Station, 100, 215, 426
New York State Museum, 15
Newcomer, E. J., 274, 275, 353, 494
Newcomer, E. J., and Carter, R. H., 276, 427
Newcomer, E. J., Dean, F. P., and Rolfs, A. R., 354, 428
Newman, L. J., 277
Newton, H. C. F., 152
Newton, J. H., 575, 576
Nisikawa, Y., 355
Nonell Comos, J., and Bardia R., 495
Nowotny, R., 5, 56, 216
Nursery and Market Garden Industries' Development Society, Ltd., 64, 496
O'Kane, W. C., 356
Ontario Department of Agriculture, 26, 27, 101
Oregon Agricultural Experiment Station, 49, 217, 218
Osburn, M. R., 102
Osima, S., 278
Ossenbeck, A. See Schepss, W.
Osterberger, B. A. See Hinds, W. E.
Pannewitz, E., 279
Parket, J. R., Shotwell, R. L., and Morton, F. A., 497
Patterson, N. A., 577
Pazler, J., 578
Peet, C. H., 429, 664
Permutit, A.-G., 498
Persing, C. O., 579
Pertusi, C., 219
Pescott, R. T. M., 430
Pettey, F. W., 280
Pettey, F. W., and Mossop, H. C., 220
Petty, B. K. See Ripley, L. B.
Pflug, H., König, J., Mengele, H., Moll, F., and Engels, W., 431
Pflug, H. See Wolman, E. H.; Wolman, K. H.; Wolman, K. W.
Phelps, S., 16
Phillips, P. H. See Hart, E. B.
Phillips, P. H., English, H., and Hart, E. B., 580
Phillips, P. H., Halpin, J. G., and Hart, E. B., 581
Phillips, P. H., Hart, E. B., and Bohstedt, G. B., 499
Phillips, P. H., and Lamb, A. R., 500
Pierce, W. D., 50
Pilat, M., 582, 583
Pilyugina, O. See Sakharov, N.
Plank, H. K., 432
Poda, E., 584
Poeteren, N. van, 221
Polivka, J. B., 281. See also Huber, L. L.
Poole, E. J. See Burgess, R.
Porter, B. A., and Sazama, R. F., 153
Pray, H. A. H. See Jacobson, C. A.
Pussard, R., 433, 501
Quaintance, A. L., and Siegler, E. H., 357
Rabanus, A., 282
Radeloff, H. See Brodemann, G.
Rambousek, F., 283
Randall, M. See Light, S. F.
Raucourt, M., 585
Record, P. R. See Kick, C. H.
Regan, W. S., 284
Regnier, P.-R., 285
Rekach, V. N., 434
Reynolds, D. S., 586. See also Marshall, H. L.
Rice, G. E., 636, 647
Richardson, C. H., and Glover, L. H., 358
Richardson, C. H., and Haas, L. E., 359
Richardson, C. H., and Thurber, G. A., 435
Richardson, N. A. See Bryan, J.
Riesenfeld, E. H., 360
Ripley, L. B., 65, 103
Ripley, L. B., and Hepburn, G. A., 222, 286, 502, 503, 587
Ripley, L. B., and Petty, B. K., 361, 504, 505
Roark, R. C., 104, 287, 436, 588, 615. See also Carter, R. H.
Roark, R. C., and Busbey, R. L., 614
Robertson, G. H., 176
Robertson, M. E., Marriott, R. H., and Humphreys, F. E., 506
Robinson, B. See MacIntire, W. H
Robinson, R. H., 507

Roland, G. See Decoux, L.
Rolfs, A. R. See Newcomer, E. J.
Rooke, H. G. D., 223
Ross, G. H., 641
Roubaud, E., 224
Rukavishnikov, B. I., 362
Runner, G. A., 363
Runner, G. A., and Eyer, J. R., 133
Rust, S. F., 589
Ryall, A. L., 508. See Haller, M. H.; Smith, E.
Sachs, A. P., 657. See Minaeff, M. G.
Sakharov, N., Pilyugina, O., and Ginsburg, D., 509
Saladini, B., 177
Salfeld, H. See Loewe, S.
Salinas, T. See Casares, J.
Saline Ludwigschalle, 364
Salzberg, P. L., and Bousquet, E. W., 676
Salzberg, P. L., and Meigs, F. M., 682
Sanchis, J. M., 510
Sanders, P. D., and Langford, G. S., 225
Savage, J. R. See Huber, L. L.
Savchenko, E. N., 590
Savchenko, G. S. See Tananaev, I. V.
Sazama, R. F. See Porter, B. A.; Steiner, L. F.
Scharrer, K., and Schropp, W., 365
Schepss, W., Tietze, E., and Ossenbeck, A., 652
Schewket, N. See Langenbuch, R.
Schmidt, E. W., 643
Schleusener, W. See Goetze, G.
Schmittutz, C., 366, 686, 691
Schour, I., and Smith, M. C., 591
Schropp, W. See Scharrer, K.
Schwalbe, C. G., 367
Scott, E. W., Abbott, W. S., and Dudley, J. E., Jr., 30
Scott, E. W., and Henne, A. L., 592
Sertz, H., 43
Shafer, G. D., 11
Shaw, W. H. See MacIntire, W. H.
Shekera, E. See Sinitzkii, N.
Shepard, H. H., and Carter, R. H., 437
Sherwood, E. C., 105
Shotwell, R. L. See Parket, J. R.
Shuey, G. A., 288, 438
Shull, W. E., 368
Siegel, W., 621, 634
Siegler, E. H. See Quaintance, A. L.
Siegler, E. H., Brown, L., and Yothers, M. A., 178
Simanton, F. L., Dicke, F. G., and Bottger, G. T., 289
Sinitzkii, N., Shekera, E., and Levkovtzeva, V., 290
Skalov, Y. Y., and Miram, E. F., 593
Sleesman, J. P. See Gui, H. L.
Smit, B., 291, 511
Smith, C. E. See Kerr, A. P.
Smith, C. M., Hamilton, E. H., and Graham, J. J. T., 292
Smith, E. See Haller, M. H.
Smith, E., Ryall, A. L., Gross, C. R., Carter, R. H., Murray, C. W., and Fahey, J. E., 512
Smith, E. C., and Allen, N., 106
Smith, H. V., 594, 595. See also Smith, M. C.
Smith, H. V., and Smith, M. C., 369
Smith L. B., 107
Smith, L. M., 226
Smith, M. C., 513, 196. See also Lantz, E. M.; Schour, I.; and Smith, H. V.
Smith, M. C., Lantz, E. M., and Smith, H. V., 293, 294, 597
Smith, M. C., and Leverton, R. M., 514
Smith, M. C., and Smith, H. V., 598
Smith, O. M., and Dutcher, H. A., 515
Smyth, H. F., and Smyth, H. F., Jr., 370
Snapp, O. I., 154
Snapp, O. I., and Thomson, J. R., 371
Snyder, T. E., 17
Söll, J. See Specketer, H.
Sorenson, C. J., 372
Sorogozhskaya, 599
South Carolina Agricultural Experiment Station, 108
Specketer, H., and Söll, J., 670, 671
Spencer, H. See Hinds, W. E.
Speyer, E. R., 295
Spuler, A. See Melander, A. L.
Squire, F. A., 439

Stanley, W. W., 440. See also Marcovitch, S.
Steer, W. See Hey, G. L.
Steer, W., and Thomas, F. J. D., 600
Steiner, L. F., Sazama, R. F., and Fahey, J. E., 516
Steinherz, D., 654
Steinkopf, W., 134, 227
Stevenson, E. P., 627
Stone, I., 296
Stacener, C. L., 297
Suire, J., 441
Sullivan, F. W., Jr., and Adams, E. W., 660
Suzuki, H., and Nakamura, S., 298
Tananaev, I. V., and Savchenko, G. S., 517
Tanganyika Territory Department of Agriculture, 373
Tattersfield, F. See Gimingham, C. T.
Tattersfield, F., and Gimingham, C. T., 75
Taylor, M. C., 644
Tennessee Agricultural Experiment Station, 442
Thamann, F. See Machle, W.
Thomas, F. J. D., 601. See also Steer, W.
Thomas, J. O. See DeEds, F.
Thompson, H. W., 109, 155
Thompson, R. W., 444
Thompson, T. G., and Taylor, H. J., 445
Thompson, W. L., 518
Thomsen, M., and Wichmand, H., 443
Thomson, J. R. See Snapp, O. I.
Thurber, G. A. See Richardson, C. H.
Tietze, E. See Schepss, W.
Tobey, E. R. See Bonde, R.
Trage, H., 602
Traut, I. I. See Ugryomov, G. D.
Tucker, R. W. E., 519
Turner, N., 374, 520, 603, 604. See also Friend, R. B.
Turner, N., and Friend, R. B., 605
Tziopkalo, (V.), 446
Ugryomov, G. D., and Traut, I. I., 228
Union Chimique Belge, Société Anonyme. See Guillissen, J.
Union of South Africa Department of Agriculture, 44
United States Department of Agriculture, Bureau of Entomology (and Plant Quarantine), 18, 76, 77, 78, 299, 606, 607
United Stated Department of Agriculture, Food and Drug Administration, 608
United States Tariff Commission, 156
Urquijo, L. P., 521
Van Leeuwen, E. R. See McAlister, L. C.
Vinas, J., 609
Wagner, G. H. See Gitzen, W. H.
Wagner, R. D. See Bishopp, F. C.
Walker, H. G. See Anderson, L. D.
Walker, H. W., 157. See also Gehauf, B.
Walker, H. W., and Mills, J. E., 110
Wallengren, H., 229
Walter, E. V., 31
Walton, C. See Kearns, H. G. H.
Warburton, C., 66
Watson, J. R., 673, 674
Webster, R. L., 522
Wells, R. W., Bishopp, F. C., and Laake, E. W., 51
Wheeler, H. W., 523
Whitcomb, W. D., 300, 524
White, C. B., 645
White, F. G. See Light, S. F.
White, R. P., and Hamilton, C. C., 610
White, W. B., 447, 525
White, W. H., 611
Whitmore, W. F. See Hartman, E. F.
Wichmand, H. See Thomsen, M.
Wichmann, H. J., and Dahle, Dan, 447a
Wigdor, M. See Hall, M. C.
Wilbur, D. A., and Bryson, H. R., 526
Wilcox, J. See Mote, D. C.
Wilder, O. H. M. See Kick, C. H.
Wilder, W. See Kick, C. H.
Wilkinson, H., 301
Willard, H. H., and Winter, O. B., 448
Wille, J., 37
Williams, C. G., 449
Wilson, C. C., 135
Wilson, E. E., 612

Wilson, H. F., 527
Wilson, L. B., 450
Winter, O. B., and Butler, L., 451
Winter, O. B. See Willard, H. H.
Wöber, A., 38
Woglum, R. S., and Borden, A. D., 45
Woglum, R. S., La Follette, J. R., Landon, W. E., and Lewis, H. C., 528
Woglum, R. S., and Lewis, H. C., 613
Wolfenbarger, D. C., 529
Wolman, E. H., and Pflug, H., 302
Wolman, K. H., 638, 640
Wolman, K. H., and Pflug, H., 661
Wolman, K. W., 623
Wolman, K. W., and Pflug, H., 684
Wood, H. P., 34, 52
Wood, H. P. See Bishopp, F. C.
Worbley, L. H. See Caffrey, D. J.
Wright, J. H. See Minaeff, M. G.
Wurzschmitt, B., 637
Wymore, P. H., 303. See also Freeborn, S. B.
Yother, M. A. See Siegler, E. H.
Yothers, W. W. See Hill, S. B., Jr.
Zacher, F., 39
Zalkind, M. D. See Korab, I. I.
Zeisert, E. E. See Dietz, H. F.
Zimmerman, M., 678

SUBJECT INDEX

Abraxas grossulariata, 142
Acanthopsyche junodi, 361, 504
Acetyl fluoride, 492
Adhesives, 502. See also kind of adhesive.
Aglais urticae, 582
Agrotis munda, 277
Agrotis segetum, 578
Agrotis ypsilon, 82, 129, 146
Airplane, dusting by, 69, 71, 72
Alfalfa caterpillar. See Eurymus eurytheme.
Alfalfa hopper, three cornerd. See Stictocephala festina
Alfalfa looper. See Autographa californica.
Alizarin-zirconium indicator, 296, 445, 448
Aluminum fluoride, 248
Aluminum fluorides, 136. See also Fluoaluminates.
Aluminum fluosilicate, 122, 139 142, 295
Aluminum hexafluoric acid, 202
Amines, fluosilicates of, 391
Ammonium acid fluoride, 248, 321
Ammonium bifluoride, 25
Ammonium fluoaluminate, 437
Ammonium fluoride, 25, 321, 514
Ammonium fluosilicate, 40, 171
Amphiacusta caribbea, 519
Analytical methods, 167, 192, 196 219, 235, 242, 244, 288, 292, 296, 315, 376, 377, 393, 396, 398, 438, 445, 447, 447a, 448, 451, 510, 515, 517, 545, 584, 586, 592, 594, 608
Angoumois grain moth. See Sitotroga cerealella.
Aniline fluosilicate, 145
Aniline, N-methyl-, fluosilicate, 145
Animal economy, role of fluorine in, 6
Anthomyidae, 46
Anthonomus eugenii, 318, 392, 470
Anthonomus grandis, 73, 102, 110, 151. See also Boll weevil.
Anthonomus pomorum, 568, 600
Anthrenus scrophulariae, 422
Anticarsia gemmatilis, 195, 201, 257. See also Velvetbean caterpillar.
Antifouling paint containing fluorine, 278
Antimony tetrafluoric acid, 202
Ant, Argentine. See Iridomyrmex humilis.
Ant, carpenter. See Camponotus pennsylvanicus.
Ant, crazy. See Prenolepis longicornis.
Ant, garden. See Lasius niger americanus.
Ant, house, 473
Ant, red thief. See Solenopsis molesta.
Ant, shed-builder. See Cremastogaster lineolata.
Ants, 24, 59
Aphis tavaresi, 511
Apocheima cinerarius, 493
Apple blossom weevil. See Anthonomus pomorum.
Apple curculio. See Tachypterellus quadrigibbus.
Apple flea weevil. See Orchestes pallicornis.
Apple maggot, 460
Apple sawfly. See Hoplocampa testudinea.
Apple surface-eating tortricid. See Cacoecia podana.
Apple thrips. See Thrips imaginis.
Argyresthia ephippiella, 204
Argyrotaenia citrana, 532
Armadillidium speyeri, 64
Armyworm, See Cirphis unipuncta
Armyworm, fall. See Laphygma frugiperda.
Armyworm, yellow-striped. See Prodenia ornithogalli.
Armyworms, 93. See also Laphygma exempta
Aromatic sulfonyl fluorides, 134, 227
Ascia rapae. See Pieris rapae.
Asparagus beetle. See Crioceris asparagi.
Asynonychus godmani, 541
Atomaria linearis, 265
Atropos sp., 422
Autographa brassicae, 558, 613
Autographa californica, 533

Bacterium pruni (bacterial spot of peach), 96, 111
Bagworm. See Thyridopteryx ephemeraeformis.
Baits, 36, 49, 54, 64, 74, 82, 83, 85, 93, 94, 97, 109, 112, 117, 118, 128, 129, 131, 132, 146, 155, 163, 203, 204, 217, 223, 226, 232, 247, 255, 258, 273, 277, 286, 299, 301, 305, 309, 311, 312, 327, 328, 331, 346, 349, 350, 359, 375, 388, 410, 419, 420, 435, 440, 442, 452, 455, 461, 466, 468, 471, 497, 511, 518, 533, 547, 563, 573, 577, 578
Barium fluoaluminate, 437
Barium fluoride, 60, 84, 98, 110, 111, 123, 147, 170, 210, 211, 237, 310, 321
Barium fluosilicate, 120, 122, 139, 153, 157, 161, 171, 174, 184, 189, 212, 213, 218, 225, 230, 231, 237, 241, 242, 251, 257, 259, 264, 267, 268, 274, 275, 276, 284, 286, 289, 295, 310, 314, 316, 318, 319, 321, 322, 323, 324, 327, 336, 337, 338, 342, 346, 353, 354, 356, 357, 361, 363, 370, 371, 374, 378, 379, 380, 381, 383, 384, 387, 392, 394, 397, 399, 403, 404, 408, 411, 412, 415, 417, 419, 420, 421, 422, 423, 424, 430, 432, 433, 437, 441, 444, 446, 453, 456, 457, 463, 465, 469, 470, 471, 472, 477, 480, 481, 484, 485, 487, 490, 495, 501, 505, 514, 520, 521, 523, 524, 529, 532, 535, 536, 539, 541, 546, 548, 554, 555, 556, 557, 558, 561, 563, 565, 570, 576, 579, 583, 600, 601, 603, 605, 606, 607, 609, 613
Bean beetle, 148. See also Mexican bean beetle.
Bean leaf beetle. See Ceratoma trifurcata.
Bean weevil. See Mylabris obtectus.
Bean worms, 432
Beet fly, 271. See also Pegomyia hyoscyami or P. hyoscyami var. betae.
Beet weevil, or beet root weevil. See Bothynoderes punctiventris.
Benzidine acetate in reagent for fluorine determination, 219
Benzoatofluoboric acid, 335
Black scale, 532
Blatta orientalis, 140, 407, 422
Blattella germanica, 26, 99, 140, 422
Blister beetle, black. See Epicauta funebris.
Blister beetle, gray. See Macrobasis unicolor.
Blister beetle, margined. See Epicauta marginata.
Blister beetle, striped. See Epicauta lemniscata.
Blister beetles, 89, 96, 151, 404, 457. See also Epicauta sericea and Epicanta sp.
Blood albumin as adhesive spreader, 532
Blowflies, sheep, 291, 343, 454
Boll weevil, 98, 157, 236, 406. See also Anthonomus grandis.
Bones, effect of fluorine on, 214
Booklice. See Atropos sp.
Bordeaux mixture, incompatibility with fluosilicates, 122
Borofluosilicates, 1
Bothynoderes punctiventris, 290, 362
Bovica bovis, 368
Brachyderes incanus, 551
Brachyrhinus ovatus, 97, 131, 247, 300
Brachyrhinus rugifrons, 131
Brachyrhinus sulcatus, 97, 255, 300, 610
Bran in baits, 54, 277, 533
Bronze beetle. See Eucolaspis brunnea.
Bupalus piniarius, 84
Byturus tomentosus, 412, 557
Cabbage butterfly. See Pieris brassicae.
Cabbage caterpillars, 66
Cabbage looper, 611. See also Autographa brassicae.
Cabbage webworm, 611
Cabbage worm, imported, 611. See also Pieris rapae.
Cacoecia podana, 601
Cadmium fluosilicate, 122
Calandra oryzae, 306, 439
Calcium arsenate-fluosilicate mixture, 70, 77, 86

Calcium fluoaluminate, 437
Calcium fluoride, 60, 63, 147, 177, 185, 237, 321, 415, 458, 506, 514, 566, 569, 570
Calcium fluosilicate, 63, 73, 79, 80, 105, 122, 126, 142, 148, 161, 164, 171, 178, 193, 197, 215, 286, 289, 317, 320, 361, 394, 425, 444, 536, 562
Calcium fluosilicate compound, 67, 86, 95, 120, 126, 137, 154, 161, 237, 308, 320, 321, 382
Calcium metabolism in white rats, 486, 513
Caliroa limacina, 599
Camponotus pennsylvanicus, 13, 22, 26
Capnodis tenebrionis, 501
Caraway moth. See Depressaria nervosa.
Carbon disulfide, effect on toxicity of potassium fluosilicate, 371
Carrion beetles, 498
Carpet beetle. See Anthrenus scrophulariae.
Carpocapsa pomonella, 178, 209, 218, 220, 262, 274, 275, 276, 280, 284, 510, 552, 553, 554, 595, 408, 411, 421, 427, 428, 430, 462, 474, 479, 480, 484, 494, 496, 522, 530, 538, 539, 565, 575, 576
Casein-lime spreader for fluorine-fish oil pastes, 153
Centipede, garden. See Scutigerella immaculata.
Cerantoma trifurcata, 73
Cerous fluoride, 248
Cerous nitrate for fluorine determination, 233
Chalcodermus aeneus, 231
Charcoal as diluent for fluosilicates, 122
Cheimatobia brumata, 142
Cherry curculio. See Tachypterellus consors cerasi.
Cherry fly or cherry fruitfly, 375. See also Rhagoletis cerasi, R. cingulata, and R. fausta.
Cherry sawfly. See Caliroa limicina.
Cherry slug. See Eriocampoides limacina.
Chicken lice. See Lice, poultry
Chloroacetatofluoboric acid, 335
Chromium fluoride, 248
Cirphis unipuncta, 118, 533
Clay as fluosilicate diluent, 122, 465, 563
Clothes moths, 175, 250, 263, 287, 591, 436, 614. See also Tinea pellionella and Tineola biselliella.
Cockroach, German. See Blattella germanica or Phyllodromia germanica.
Cockroaches, 10, 11, 19, 27, 30, 31, 39, 41, 44, 48, 55, 59, 205, 519. See also Blatta orientalis, Periplaneta americana, P. australasiae, P. fuliginosa, and P. orientalis.
Codling moth. See Carpocapsa pomonella.
Colorado potato beetle, 585. See also Leptinotarsa decemlineata.
Confused flour beetle. See Tribolium confusum.
Coniophora cerebella, 302
Conotrachelus nenuphar, 154
Contact insecticide, sodium fluoride as, 11
Copper fluoride, 147
Copper fluosilicate, 122, 139, 171, 413
Copper sulfate for impregnating wood, 5
Corn bill-bug. See Sphenophorus maidis.
Corn borer, 281. See also European corn borer.
Corn ear worm, 526. See also Heliothis obsoleta.
Corn weevil, 191. See also Calandra oryzae.
Cornstarch in ant powder, 47
Cotton bollworm. See Heliothis obsoleta.
Cotton flea hopper, 249
Cowpea curculio. See Chalcodermus aeneus.
Cowpea weevil. See Mylabris quadrimaculatus
Cranberry root worm. See Rhadopterus picipes.
Cremastogaster lineolata, 13, 22, 26

Cricket. See Amphiacusta caribbea.
Cricket, field. See Gryllus assimilis.
Cricket, snowy tree. See Oecanthus niveus.
Cricoceris asparagi, 99
Cryolite, 62, 63, 73, 98, 110, 153, 161, 174, 177, 212, 213, 220, 222, 224, 230, 231, 237, 259, 262, 264, 274, 275, 276, 280, 286, 295, 310, 314, 316, 321, 328, 329, 333, 352, 353, 354, 356, 357, 361, 363, 364, 370, 371, 379, 386, 392, 395, 398, 402, 403, 404, 406, 408, 409, 415, 418, 423, 426, 428, 432, 435, 437, 452, 453, 459, 460, 462, 463, 464, 469, 470, 472, 474, 478, 479, 480, 487, 494, 496, 502, 504, 505, 514, 516, 522, 524, 528, 530, 532, 538, 539, 544, 549, 552, 554, 556, 571, 575, 576, 579, 600, 604, 606, 607, 611, 613
Cucumber beetle, spotted or twelve-spotted, 81. See also Diabrotica duodecimpunctata.
Cucumber beetle, striped, 81, 89, 95, 96, 100, 127. See also Diabrotica vittata.
Cucumber beetle, western spotted. See Diabrotica soror.
Cucumber beetles, 100, 148, 193.
Cucurbit flies, 455
Culex quinquefasciatus, 147, 150, 174
Cupric fluoride, 248, 269
Curtilla gryllotalpa, 381
Cutworm, clay-backed. See Feltia gladiaria.
Cutworm, dark-sided. See Euxoa messoria.
Cutworm, dingy. See Feltia ducens.
Cutworm, greasy. See Agrotis ypsilon.
Cutworm, variegated. See Lycophatia margaritosa.
Cutworms, 65, 93, 118, 128, 163, 420, 452, 471. See also Agrotis munda, Euxoa segetis, E. spinifera, Polia inferior, Prodenia litura, and Spodoptera mauritia.
Cydia pomonella. See Carpocapsa pomonella.
Cyllene robiniae, 116
Depressaria nervosa, 535
Derris-fluorine dust, 51, 523
Diabrotica duodecimpunctata, 168, 358
Diabrotica soror, 99
Diabrotica vittata, 73, 74, 126, 151, 168
Diamondback moth, 611. See also Plutella maculipennis.
Diatomaceous earth, diluent for fluorine dusts, 226, 368, 379, 418
Diatraea grandiosella, 387
Diatraea saccharalis, 69, 151
Diatraea saccharalis crambidoides, 124, 125
Diazonium compounds of metallic fluoric acids, 202
Dociostaurus marocanus, 223
Downy mildew, dusting cucumbers for, 193
Drainage water, fluorine in, 475
Drosophila ampelophila, 577
Dry rot, preserving wood against, 5, 162
Dutox, 284, 417, 430, 456, 465, 481, 536, 539, 546, 548, 561. See also Barium fluosilicate.
Dyslobus decorata, 217
Earwig, European, 49, 132, 466. See also Forficula auricularia.
Eggplant flea beetle. See Epitrix fuscula.
Eggs, fluorine in, 550, 581
Epicauta funebris, 67, 79
Epicauta lemniscata, 67, 77, 79, 92
Epicauta marginata, 67, 79, 465
Epicauta pennsylvanica, 465
Epicauta servicea, 372
Epicauta sp., 151
Epilachna corrupta, 73, 76, 151, 251, 259, 549
Epilachna viginti octopunctata, 351
Epitrix cucumeris, 73, 213, 264, 380, 403, 453, 485, 520, 529, 549, 603
Epitrix fuscula, 549
Epitrix parvula, 549
Epitrix subcrinita, 403
Eriocampoides limacina, 341
Estigmene acraea, 297
Eucolaspis brunnea, 208, 546

Euglena viridis, 150
Eulans, 239
Eumerus tuberculatus, 258
European corn borer, 215, 224, 289, 337, 382, 394, 562. See also Pyrausta nubilalis.
Eurymus eurythene, 533
Euxoa messoria, 82
Euxoa segetis, 301
Euxoa spinifera, 301
Fall webworm. See Hyphantria cunea.
Feltia ducens, 82, 151
Feltia gladiaria, 82
Ferric acetylacetone for fluorine determination, 376
Ferric chloride for fluorine determination, 196, 396
Ferric fluoride, 1
Ferric fluosilicate, 1
Fish oil in fluorine sprays, 153, 220, 276
Flea beetle, mint. See Longitarsus menthaphagus or L. waterhousei.
Flea beetle, potato, 388. See also Epitrix cucumeris and E. subcrinita.
Flea beetle, tobacco, 174, 384, 607. See also Epitrix cucumeris and E. parvula.
Flea beetles, 96, 151. See also Phyllotreta sp.
Flies, 16, 25, 173. See also Musca domestica, Muscidae, Anthomyidae and kind of flies.
Floris, 381
Flour as diluent for insecticides, 39, 128, 234, 457, 465, 481, 563
Fluoaluminates, 190. See also kind of fluoaluminate.
Fluorenetic, 248
Fluorides, 32, 104, 138, 169, 198, 199, 209, 245, 321, 326, 385, 429. See also kind of fluoride.
Fluorides, acid, 492
Fluor spar, 60, 298
Fluosilicates, 81, 104, 145, 153, 169, 175, 177, 199, 209, 245, 260, 503, 526, 340, 391, 431, 547. See also kind of fluosilicate.
Fluosilicic acid, 169
Fluralsil, 304, 574
Flusul, 536
Foliage injury, 38, 43, 70, 80, 95, 121, 125, 127, 133, 141, 142, 220, 234, 259, 295, 303, 310, 329, 337, 342, 361, 363, 371, 375, 384, 403, 412, 414, 509, 554. See also Plant injury.
Foods, fluorine content of, 12
Forficula auricularia, 54, 99, 112, 299
Formaldehyde, superiority to sodium fluoride as fly poison, 16
Formyl fluoride, 492
Fruits, fluorine in, 12, 482
Fuller's earth in calcium fluosilicate dust, 536
Fuller's rose beetle. See Asynonychus godmani.
Fumigants, 43, 74
Gelatin, fluorine in, 416, 506
Gelechia malvella, 434
Genista caterpillar. See Tholeria reversalis.
Gladiolus thrips, 571
Glue in sodium fluosilicate sprays, 141
Glycerin in earwig bait, 54
Goniocotes compar, 52.
Grain mite. See Tyroglyphus farinae.
Grain weevil. See Sitophilus granaria.
Granary weevil, 345
Grape berry moth, 363
Grape leafhopper. See. Typhlocyba comes.
Grape worms, 184
Grapholitha packardi, 341
Grasshopper, bird. See Schistocerca americana.
Grasshopper, differential, 359. See also Melanoplus differentialis.
Grasshopper, red-legged, 359. See also Melanoplus femur-rubrum.
Grasshoppers, 135, 151, 203, 425, 442, 461, 518, 593. See also Schistocerca gregaria, Melanoplus mexicanus, and M. bivittatus.
Gryllotalpa gryllotalpa, 346, 433, 441, 495
Gryllus assimilis, 350

Gypsum as diluent for insecticides, 81, 95, 135, 193
Gypsy moth. See Porthetria dispar.
Hadena oleracea. See Polia oleracea.
Haematopinus asini, 28
Haematopinus eurysternus, 88, 444
Haematopinus macrocephalus, 28
Haematopinus vituli, 88, 444
Heliothis obsoleta, 106, 165, 240, 270, 431, 533
Hemerocampa leucostigma, 464
Hexafluophosphoric acid, organic salts of, 206
Hides, fluorine in curing, 416, 506
Holcocera icoryaella, 528
Hoplocampa testudinea, 477, 600
Hydrarsil, 339
Hydrofluoric acid, 43, 169
Hydrofluosilicic acid, 1
Hylobius abietis, 443
Hyphantria cunea, 137, 464
Hyponomeuta malinellus, 234
Incompatibilities, 122, 161, 241, 322, 324, 503, 549
Infusorial earth as diluent for barium fluosilicate, 384
Intratherapeutic treatments of plants, 261
Iridomyrmex humilis, 45
Iron fluoride, 1
Iron fluosilicate, 413
Japanese beetle, 107, 122, 424. See also Popillia japonica.
Kalite, 386
Kaolin as a diluent for fluorine spray, 534
Kidneys of rats effect of fluorine on, 500
Lactatofluoboric acid, 335
Laphygma exempta, 373
Laphygma frugiperda, 128, 129, 146, 533
Larvae, 239
Lasioderma serricorne, 172, 422
Lasius niger americanus, 91
Laspeyresia molesta, 121, 267, 329
Lead arsenate-sodium fluosilicate mixture, 70
Lead fluochloride, 167
Lead fluoride, 108, 147, 437
Lead fluosilicate, 139, 171
Leatherjackets, 109
Lepisma domestica, 42
Lepisma saccharina, 22, 42, 422
Lepisma sp., 27, 307
Leptinotarsa decemlineata, 73, 151, 338, 397
Lice, biting, 21, 28, 151
Lice, cattle, 21. See also Trichodectes scalaris, Linognathus vituli, Bovica bovis, Haematopinus eurysternus, and H. vituli.
Lice, dog, 21. See also Trichodectes latus.
Lice, goat. See Trichodectes climax.
Lice, horse, 21. See also Trichodectes pilosus, T. parumpilosus or T. equi, and Haematopinus macrocephalus.
Lice, long-nosed ox. See Haematopinus vituli.
Lice, pigeon. See Liperus baculus and Goniocotes compar.
Lice, poultry, 18, 20, 34, 61, 130, 176, 235, 254. See also Lipeurus heterographus.
Lice, short-nosed ox. See Haematopinus eurysternus.
Lice, sucking, 21, 28
Lime in fluorine insecticides, 62, 67, 74, 80, 81, 95, 100, 101, 105, 108, 115, 121, 122, 125, 126, 127, 133, 135, 141, 148, 154, 168, 193, 211, 234, 241, 251, 351, 355, 372, 387, 403, 456, 465, 491, 520, 521
Lime-sulfur, incompatibiliby with fluosilicates, 122
Linognathus vituli, 51
Linseed oil, adhesive for cryolite, 502
Liperus baculus, 52
Lipeurus heterographus, 68
Liponyssus bursa, 53
Listroderes obliquus, 319
Locust borer. See Cyllene robiniae.
Locust, brown, 65
Locust, desert, 186. See also Schistocerca gregaria.
Locust, migratory. See Locusta migratoria and L. migratoria migratorioides.

Locust, Moroccan. See Dociostauras marocanus and Stauronotus maroccanus.
Locusta migratoria, 582, 583
Locusta migratoria migratorioides, 331, 468, 547
Locusts, 203, 246
Long-horned tree-hopper of coconuts, See Sexava spp.
Longitarsus menthaphagus, 86
Longitarsus waterhousei, 555
Loxostege sticticalis, 211, 362
Lumbricus terrestris, 150
Lycophotia margaritosa var. saucia, 82
Macrobasis unicolor, 67, 79
Macrodactylus subspinosus, 133
Magnesium fluoaluminate, 437
Magnesium fluoride, 147, 437, 570
Magnesium fluosilicate, 63, 139, 162, 177, 237, 310, 321
Maize stalk-borer, 103, 22
Manganese fluoride, 437
Mansonia perturbans, 344
Meadow moth. See Loxostege sticticalis.
Mealybugs, 220
Mediterranean fruit fly, 269, 587
Melanoplus bivittatus, 498
Melanoplus fidderentialis, 435
Melanoplus ferum-rubrum, 94, 359 440
Melanoplus mexicanus, 497
Melittia satyriniformis, 115
Mercuric fluoride, basis, 243
Mercury fluosilicate, 339
Mercury succinimide in reagent for fluorine determination, 219
Merodon equestris, 258
Merulius lacrymans, 574
Metarrhizium anisopliae, 229
Mexican bean beetle, 63, 76, 105, 120, 164, 174, 212, 213, 225, 374, 378, 409, 456, 467, 536, 605. See also Epilachna corrupta and Bean beetles.
Mice, 55
Midges, 399
Milk, fluorine in, 499
Mineral oil in fluorine sprays, 379 528, 532, 579
Mineral waters, fluorine in, 2, 4, 8, 192, 584
Mite, feather. See Liponyssus bursa.
Mite, grain. See Tyroglyphus farinea.
Mites, poultry, 20, 34, 61, 254
Molasses in baits, 54, 118, 503
Mole cricket, 327. See also Gryllotalpa gryllotalpa and Curtilla gryllotalpa.
Monomorium destructor, 47
Mosquitoes. See Culex quinquefasciatus.
Moths or mothproofing. See Clothes moths.
Mottled enamel of teeth. See Teeth.
Mulberry geometrid. See Apacherina cinerarius.
Musca domestica, 266
Muscidae, 46
Mylabris obtectus, 490
Mylabris quadrimaculatus, 490
Narcissus bulb fly. See Eumerus tuberculatus or Merodon equestris.
Natal fruit fly, 179. See also Pterandrus rosa.
Neotermes militaris, 383
Nicotine sulfate, 322, 324
Oecanthus niveus, 226, 238
Oleolactofluoboric acid, 335
Olive knot disease, 612
Ootheca bennigseni, 373
Opatrum sabulosum, 433
Orange worm. See Agryrotaenia citrana.
Orchestes pallicornis, 561
Orchestes rufipes, 491
Organic bases, fluosilicates of, 145
Organic fluorides, 250
Orgyia antiqua, 142
Oriental fruit moth, 417. See also Laspeyresia molesta.
Oriental moth, 268
Oriental peach moth, 141
Otiorrhynchus cribricollis, See Tachypterellus quadrigibbus.
Otiorrhynchus ovatus. See Brachyrhinus ovatus.
Panolis flammea, 446
Paramecium caudatum, 150
Parholcomyrmex destructor, 47
Paria canellus var. quadrinotata, 226
Pegomyia hyoscyami, 114, 221, 312, 423

Pegomyia hyoscyami var. betae, 283, 349, 388
Pepper weevil. See Anthonomus eugenii.
Perchloric acid, 592
Periplaneta americana, 140, 273, 407, 422
Periplaneta australasiae, 140
Periplaneta fuliginosa, 140
Periplaneta orientalis, 14
Phosphate, rock, 348, 475, 500, 531
Phosphorus metabolism of white rats, 486, 513
Phyllodecta vulgatissima, 123, 330
Phyllodromia germanica, 37
Phyllotreta sp., 152
Phytometra orichaleea, 83
Phytometra (Plusia) signata, 83
Pieris brassicae, 582
Pieris rapae, 60, 548
Pigeon fly. See Pseudolynchia maura.
Pine moth. See Bupalus piniarius.
Pine noctuid. See Panolis flammea.
Pine weevil, gray. See Brachyderes incanus.
Plant ash, fluorine in, 448
Plant growth, effect of fluorine on, 531
Plant injury, 62, 67, 100, 102, 103, 106, 124, 126, 148, 165, 212, 289, 315, 318, 324, 355, 365, 373, 378, 392, 432, 453, 457, 470, 481, 526, 555, 557, 564, 606, 607. See also foliage injury.
Plants, fluorine in, 451
Platyedra malvella, 434
Platynota stultana, 487
Plum curculio. See Conotrachelus nenuphar.
Plutella maculipennis, 558
Pokia inferior, 301
Polia oleracea, 35, 295, 496
Polychrosis botrona, 609
Polyphylla decemlineata, 247
Polyporus vaporarius, 302
Polystictus versicolor, 483
Popillia japonica, 171
Porthetria dispar, 582
Potassium acid fluoride, 243, 248
Potassium aluminum fluoride. See potassuim fluoaluminate.
Potassium fluoaluminate, 225, 269, 321, 357, 363, 392, 409, 437, 470, 478, 571
Potassium fluoride, 25, 185, 321, 365, 415, 514
Potassuim fluosilicate, 40, 75, 107, 122, 142, 153, 161, 189, 241, 272, 276, 299, 357, 363, 371, 415, 437, 514, 532
Potato tuber moth, 225
Potatoes, late blight of, 159
Prenolepis longicornis, 91
Prodenia litura, 83, 301, 573
Prodenia ornithogalli, 129, 533
Prodenia praefica, 311
Protoparce quinquemaculata, 73
Protoparce sexta, 213
Pseudolynchia maura, 158
Pterandrus rosa, 286
Pyrausta nubilalis, 224, 229
Pyrethrum-fluorine mixtures, 47, 121, 205
Quinalizarin-zirconium indicator, 515
Rabbits, toxicity of sodium fluosilicate to, 160
Rape oil as adhesive for cryolite, 496
Raspberry beetle. See Byturus tomentosus.
Rat poison, 40, 55, 57, 58
Repellent, sodium fluoride as, 45
Rhadopterus picipes, 119
Rhagoletis cerasi, 410, 564
Rhagoletis cingulata, 426
Rhagoletis completa, 237, 314, 379
Rhagoletis fausta, 426
Rice weevil, 191, 540. See also Calandra oryzae.
Richmond filter dust as carrier for barium fluosilicate, 485
Roach powder, 3
Rose chafer. See Macrodactylus subspinosus.
Salt-marsh caterpillar. See Estigmene acraea.
Saponin-cryolite mixture, 295
Sawflies, 313

Scale insects, 478
Schistocerca americana, 328, 440
Schistocerca gregaria, 309, 449, 468
Scutigerella immaculata, 317
See water, fluorine in, 445
Seed disinfectants, 144, 243, 253, 521
Selenia tetralunaria, 75, 142
Sexava spp., 553
Silicofluorides. See Fluosilicates.
Silicon tetrafluoride, 43
Silkworms, 160, 187
Silverfish, 307. See also Lepisma sp., L. saccharina, or L. domestica.
Sitona spp., 509
Sitophilus granaria, 490
Sitotraga cerealella, 490
Slugs, 66, 155
Soap solution, incompatibility with fluosilicates, 122
Sodium acid fluoride, 25, 248, 321
Sodium alizarin-sulfonate indicator, 192, 377
Sodium aluminum fluoride. See cryolite.
Sodium antimony fluoride, 248
Sodium bifluoride, 25
Sodium chromic fluoride, 361
Sodium ferric fluoride, 361, 505
Sodium fluoaluminate. See cryolite.
Sodium fluoride, 1, 3, 5, 10, 11, 13-31, 34, 35, 36, 38, 39, 41, 42, 44-54, 56, 59, 61, 63, 64, 65, 68, 82, 83, 84, 85, 88, 90, 91, 93, 94, 97, 99, 101, 109, 112, 114, 116, 117, 118, 123, 130, 131, 132, 135, 138, 140, 144, 150, 158, 175, 176, 178, 182, 183, 185, 192, 200, 204, 205, 210, 211, 216, 223, 232, 235, 237, 247, 248, 252, 254, 256, 258, 260, 265, 271, 277, 282, 283, 285, 290, 291, 292, 301, 305, 307, 310, 311, 312, 313, 317, 321, 325, 330, 332, 349, 350, 356, 360, 362, 366, 367, 368, 375, 388, 400, 405, 407, 410, 414, 415, 416, 422, 423, 425, 435, 437, 443, 444, 446, 450, 454, 463, 466, 473, 483, 486, 490, 493, 500, 506, 509, 513, 514, 518, 519, 534, 542, 551, 553, 559, 563, 566, 573, 577, 578, 580, 582, 588, 589, 591, 602
Sodium fluosilicate, 1, 37, 40, 55, 57, 58, 62, 63, 66, 67, 69-80, 82, 84, 85, 89, 92, 94, 95, 96, 98, 100, 102, 103, 106, 108, 110, 111, 113, 114, 115, 117, 119-133, 135, 137, 138, 139, 141, 142, 143, 146, 147, 148, 150, 151, 152, 154-161, 163, 165, 166, 168, 170, 171, 172, 173, 178, 179, 181, 185, 186, 187, 189, 191, 193, 194, 195, 201, 203, 204, 207, 208, 217, 218, 221, 228, 229, 230, 231, 234, 236, 237, 238, 240, 241, 246, 247, 248, 249, 253, 255, 257, 266, 270, 273, 278, 281, 285, 286, 289, 290, 295, 297, 299, 300, 306, 309, 310, 315, 317, 319, 321, 328, 331, 341-345, 350, 351, 355, 357, 358, 359, 361, 362, 363, 372, 373, 403, 406, 414, 415, 422, 423, 425, 434, 437, 439, 440, 442, 443, 444, 446, 449, 455, 461, 463, 466, 467, 468, 490, 491, 493, 495, 497, 498, 503, 505, 506, 509, 511, 514, 518, 526, 532, 533, 534, 535, 537, 539, 543, 545, 568, 577, 578, 582, 583, 584, 587, 590, 593, 599, 610, 612
Sodium salicylate, 16
Sodium silicofluoride, See Sodium fluosilicate.
Sodium sulfate, 534
Soil, fluorine in, 4, 9, 32, 33, 38, 315, 450, 475, 531, 570
Solenopsis molesta, 91
Solubilities of fluorine compounds, 122, 189, 437, 459, 544
Solvents for cryolite, 459
Southern grassworm. See Laphygma frugiperda
Southwestern corn borer. See Diatraea grandiosella.
Soybean caterpillar. See Antisarsia gemmatilis.
Sparganothis pilleriana, 609
Spenophorus maidis, 108

Spilosoma lubricipeda, 60
Spodoptera mauritia, 83, 573
Spray residue, 242, 323, 347, 370, 385, 389, 438, 447, 459, 472, 479, 494, 507, 508, 512, 516, 522, 525, 538, 544, 548, 556, 560, 575, 608
Squash vine borer. See Melittia satyriniformis.
Starch as diluent for fluorine insecticides, 122
Stauronotus maroccanus, 285
Stictocephala festina, 181
Stomach poisons, action of fluorides as, 60
Strawberry root weevil, 117
Strawberry root weevil, large. See Brachyrhinus sulcatus.
Strawberry root weevil, small. See Brachyrhinus ovatus.
Strawberry root worm. See Paria canellus var. quadrinotata.
Strawberry weevil, 308
Strontium fluoride, 147, 321
Strontium fluosilicate, 122
Sugarcane borer or sugarcane moth borer, 71, 72, 143. See also Diatraea saccharalis or D. saccharalis crambidoides.
Sulfur in fluorine insecticides, 53, 151, 184, 267, 268, 371, 523
Syneta albida or Syneta leaf beetle, 99
Tachypterellus consors cerasi, 341
Tachypterellus quadrigibbus, 232, 305, 333, 402
Talc as diluent for fluorine insecticides, 86, 122, 133, 336, 337, 392, 465, 501, 528, 532, 563, 585
Teeth, effect of fluorine on, 214, 244, 295, 394, 369, 390, 393, 500, 513, 514, 569, 572, 591, 594-598
Termite, 17, 207, 325. See also Neotermes militaris.
Termite, harvester, 599
Thanalith U, 302
Thelydria contractus, 15
Tholeria reversalis, 418
Thorium nitrate in fluorine determination, 448
T(hrips) imaginis, 523.
Thyridopteryx ephemeraeformis, 464
Thyroid, dessicated, effect on fluorosia in chick, 580
Thyroid gland of rats, effect of fluorine on, 500
Tin hexafluoric acid, 202
Tinea pellionella, 239, 422
Tineola biselliella, 239, 422, 543, 603
Tipula oleracea, 419, 420
Tipula spp., 85
Titanium hexafluoric acid, 202
Titanohydrofluoric acid, 263
Tobacco beetle. See Lasioderma sericorne.
Tobacco dust as barium fluosilicate diluent, 384
Tobacco hornworm, 174. See also Protoparce sexta or P. quinquemaculata.
o-, m-, and p-Toluidine fluosilicates, 145
Tomato fruitworm. See Heliothis obsoleta.
Tomato moth, 36. See also Polia oleracea.
Tortoiseshell butterfly, small. See Aglais urticae.
Tortrix citrana, 528, 532
Tortrix pronubana, 433
Toxicity of fluorine to animals other than insects, 3, 48, 55, 59, 60, 93, 139, 150, 170, 194, 214, 244, 306, 331, 346, 347, 370, 389, 390, 401, 415, 442, 463, 476, 486, 489, 495, 499, 500, 513, 514, 527, 550, 552, 566, 569, 580, 581, 591, 594-598
Traps containing sodium fluoride, 35, 36
Treacle in bait, 36
Tribolium confusum, 306, 549
Trichodectes climax, 50
Trichodectes equi, 28
Trichodectes latus, 21, 29
Trichodectes parumpilosus, 23, 28
Trichodectes pilosus, 23, 28
Trichodectes scalaris, 51, 88, 444

Turnip webworm, 230
Tussock moth, white-marked. See Hemerocampa leucostigma.
Typhlocyba comes, 121
Tyroglyphus farinae, 101
Vegetable weevil. See Listroderes obliquus.
Vegetables, fluorine in, 12, 482
Vegetation, effect of fluorine in soil on, 9, 32, 33, 38
Velvetbean caterpillar, 197. See also Anticarsia gemmatilis.
Vesperus strepeus, 433
Vitamin C storage, effect of fluorine on, 476
Walnut husk fly, 316. See also Rhagoletis completa.
Water, fluorine in, 2, 7, 8, 192, 244, 293, 294, 369, 393, 396, 445, 475, 488, 510, 515, 550, 572, 584, 594, 595, 598
Wattle bagworm, 505. See also Acanthopsyche junodi.
Weed killer, 413
White ants. See Termites.
Whiteflies, 478
Willow beetle. See Phyllodecta vulgatissima.
Willow flea weevil. See Orchestes rufipes.
Willow weevil, 537
Wireworms [sic]. See Gryllotalpa gryllotalpa.
Wood lice, cucumber-house. See Armadillidium speyeri.
Wood preservation, 5, 17, 56, 162, 182, 183, 185, 198, 199, 200, 216, 252, 256, 279, 282, 302, 304, 325, 326, 332, 334, 339, 360, 366, 367, 391, 400, 405, 431, 483, 542, 574, 589, 602
Wood-rotting fungus, 483
Yttrium nitrate in fluorine determination, 398
Zinc chloride for impregnating wood, 5
Zinc fluoaluminate, 437
Zinc fluoride, 5, 56, 574
Zinc fluosilicate, 122, 171, 177, 248, 304, 321, 339, 413, 574
Zinc magnesium fluosilicate, 310
Zirconium. See Alizarin-zirconium indicator.

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